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DEPARTMENT OF THE INTERIOR
JOHN BARTON PAYNE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 461

SURFACE WATER SUPPLY OF THE UNITED STATES

1917

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

NATHAN C. GROVER, Chief Hydraulic Engineer
H. D. McGLASHAN and F. F. HENSHAW, District Engineers

Prepared in cooperation with
THE STATE OF CALIFORNIA

Fish & Game Commission
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1920

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Fish & Game Commission
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SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN CALIFORNIA, 1917.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow of streams in the United States during the year ending September 30, 1917.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry-civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1918.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1917, inclusive	150,000
1918	175,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 13.

Measurements of stream flow have been made at about 4,500 points in the United States, and also at many points in Alaska and the Hawaiian Islands. In July, 1917, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations.

Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

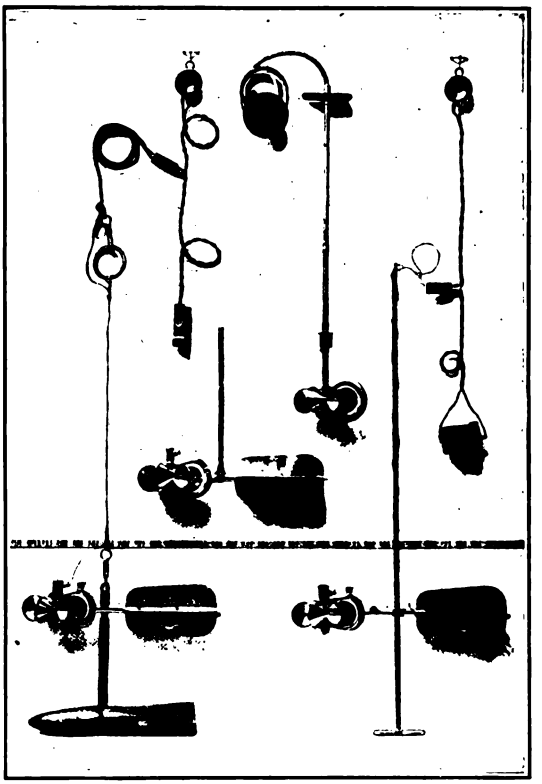
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

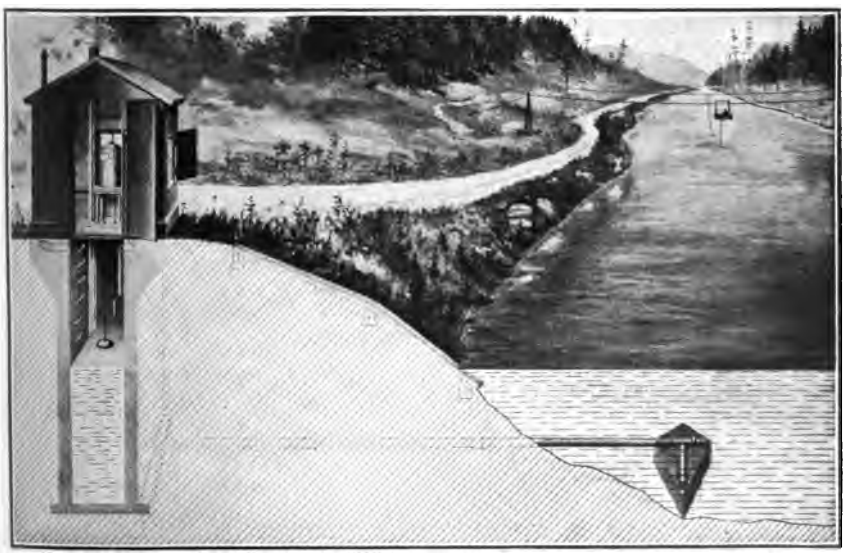
"Stage-discharge relation;" an abbreviation for the term "relation of gage height to discharge."

"Control;" a term used to designate the section or sections of the stream below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

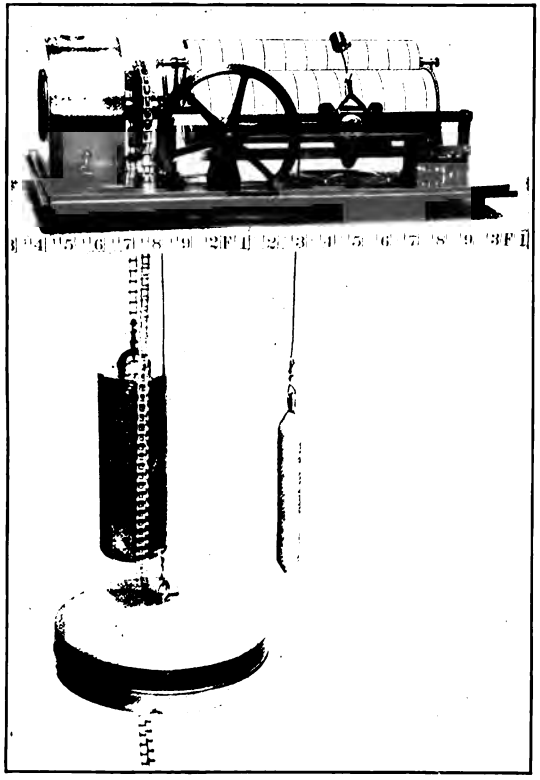
The "point of zero flow" for a gaging station is that point on the gage—the gage height—to which the surface of the river falls when the discharge is reduced to zero.



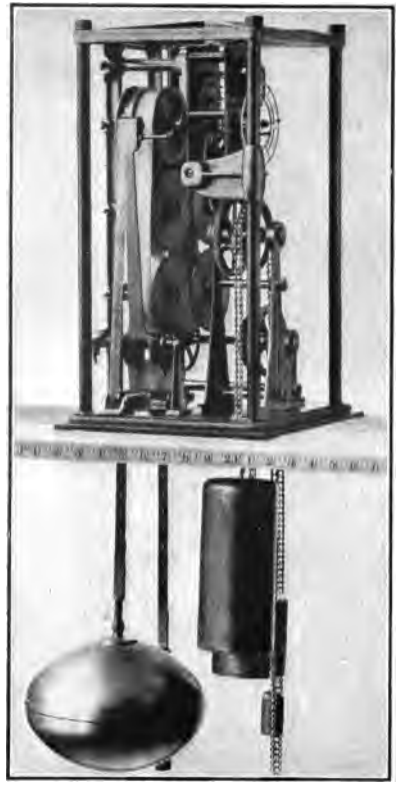
A. PRICE CURRENT METERS.



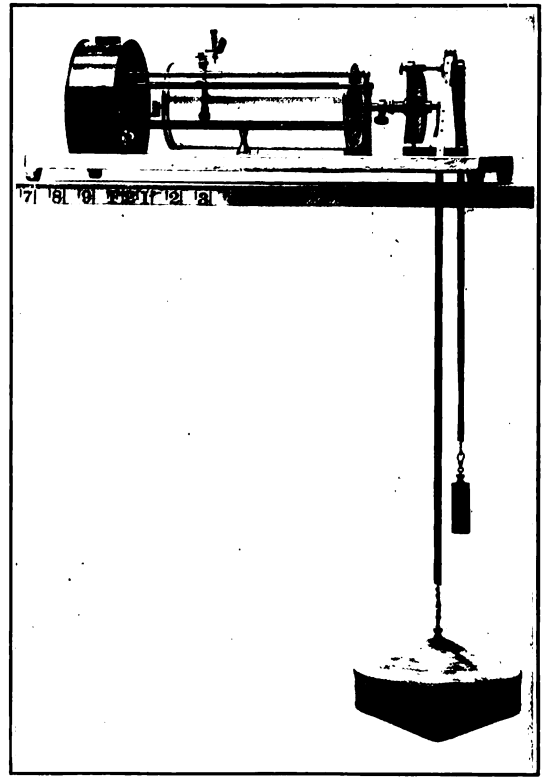
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1916, and ending September 30, 1917. At the first of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for a year beginning October 1 is practically all derived from precipitation in that year.

The base data collected at gaging stations (Pl. I, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder (Pl. II) that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements, rating curves and tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which the monthly and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage height and records of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the

mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge is obtained by averaging the discharge at regular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 10, are based.

ACCURACY OF FIELD DATA AND COMPUTED RECORDS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station or a footnote added to the table gives information regarding (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall

is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent but unknown sources of error.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the table of daily discharge allows more detailed study of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

Investigation of the water resources of California is being carried on by the United States Geological Survey, in cooperation with the State in accordance with acts of the State legislature, approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909, empowering the State authorities to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps, gaging streams, and surveying reservoir sites and canal locations for the conservation and utilization of the flood and storm waters of the State. The work for the year 1916–17 was maintained in accordance with the contract approved by the State board of control and signed by W. F. McClure, State engineer.

Additional funds for the maintenance of river measurement stations were furnished by the State Water Commission of California. The members of the commission are W. A. Johnstone, president; Irving Martin and A. E. Chandler, commissioners; W. D. Stephens, governor; and W. F. McClure, State engineer. Josephine A. Patten is secretary.

The entire expense of the stream-flow investigations in Tuolumne River drainage for the Hetch Hetchy project is paid by the city and county of San Francisco, through M. M. O'Shaughnessy, city engineer.

All stations in Los Angeles County, except on San Gabriel River, are maintained in accordance with a contract between the Board of Supervisors and the Department of Agriculture, represented by the Forest Service through F. H. Fowler, engineer, district No. 5, and the Weather Bureau through Ford A. Carpenter, meteorologist. Los Angeles County pays all expenses of the field work except services furnished by the Forest Service, Weather Bureau, and Geological Survey. The Geological Survey has supervision of the work and compiles all field data for publication.

Assistance in the maintenance of river-measurement stations was furnished by the United States Forest Service, through F. H. Fowler, engineer, district No. 5; United States Weather Bureau, through Ford A. Carpenter and N. R. Taylor, meteorologists; United States Indian

Service; United States Bureau of Fisheries; Yosemite National Park, through W. B. Lewis, superintendent; County of Los Angeles; Santa Barbara Water Commission; Volcan Land & Water Co. and Cuyamaca Water Co., through Ed. Fletcher, manager, and W. S. Post, consulting engineer; Southern California Edison Co., through H. W. Dennis, construction engineer; the Turlock, Modesto, Oakdale, and South San Joaquin irrigation districts.

Many complete estimates of run-off, gage height records, and discharge measurements are furnished by various federal bureaus, private companies, and individuals who are interested in the water resources of California. This cooperation is acknowledged and explained in the descriptions that precede the records.

The work in Oregon was carried on under a cooperative agreement with the State through John H. Lewis, State engineer. Financial cooperation was also furnished by the Goose Lake Valley Irrigation Co. and the Talent Irrigation District.

DIVISION OF WORK.

The data for stations in California were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, by F. C. Ebert, Charles Leidl, Wm. Kessler, C. J. Emerson, J. F. Kunesh, H. M. Stafford, J. C. Dort, H. J. Tompkins, and M. B. Trelease.

Data for stations in Oregon were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by C. L. Batchelder, J. E. Stewart, R. C. Briggs, and H. W. Humphrey, assistant engineer, United States Reclamation Service.

The manuscript was assembled and reviewed by B. J. Peterson.

GAGING-STATION RECORDS.

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CALIF.

LOCATION.—In SE. ¼ sec. 25, T. 15 S., R. 3 E., at Ellis ranch, 2 miles below mouth of Guatay Creek, and about 1½ miles below Descanso, San Diego County.

DRAINAGE AREA.—43.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 21, 1905, to September 30, 1917.

GAGE.—Staff in three sections on left bank a short distance below intake of Ellis ditch; used since June 11, 1916. Previous gages were at about the same place but at different datums. Gage read by C. H. Ellis.

DISCHARGE MEASUREMENTS.—Made from cable just below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and fine gravel; shifting. Banks high in most places and not likely to be overflowed. A group of large bowlders about 125 feet below gage acts as partial control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet at 8 p. m. April 16 (discharge, 320 second-feet); minimum stage, 0.00 August 28–30, September 12–15, 18–20, and 23–29 (discharge, 0.8 second-foot).

1905–1917: Maximum stage occurred January 27, 1916 (discharge, 9,870 second-feet); channel dry during parts of 1910, 1911, 1913, and 1916

DIVERSIONS.—About 0.3 second-foot is diverted above the gage for irrigation on Ellis ranch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Four fairly well-defined rating curves were used October 6 to September 30. Gage read to hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Discharge October 1–5 estimated. Records fair.

Discharge measurements of Sweetwater River near Descanso, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	F. C. Ebert	0.20	1.6	Apr. 16	McGlashan and Ebert	0.82	45
Jan. 23	do	.59	17	16	do	1.16	85
Feb. 14	do	.40	6.8	16	do	1.72	246
19	do	.52	18	17	do	1.00	82
20	do	.51	17	17	F. C. Ebert	.98	75
Mar. 13	do	.69	22	18	do	.94	53
28	do	.58	12	May 23	do	.58	11
Apr. 15	McGlashan and Ebert	.54	11	June 28	D. A. McClung	.20	1.6

Daily discharge, in second-feet, of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2	1.9	1.4	9	7.5	27	12	12	5	1.4	1.0	0.9
2	3	2.1	1.4	7	7.5	25	12	12	5	1.4	1.0	.9
3	2	2.3	1.9	26	7.5	21	12	12	4.9	1.4	1.0	.9
4	2	1.9	1.4	7.5	7.5	22	12	11	5.5	1.5	1.0	.9
5	1	1.9	1.4	7.5	7.5	20	12	10	6	1.5	.9	.9
6	10	1.7	1.3	9	7.5	21	13	10	5	1.4	1.0	.9
7	9	1.4	1.3	13	7	25	12	10	5.5	1.4	1.0	.9
8	8.5	1.4	1.5	10	7.5	19	13	12	5.5	1.4	.9	.9
9	8	1.4	1.5	10	7	21	15	10	4.9	1.3	.9	.9
10	9	1.5	1.4	8.5	8	22	15	10	4.6	1.2	.9	.9
11	8	1.5	1.9	7.5	7.5	19	13	8	4.3	1.2	.9	.9
12	6.5	1.4	1.9	6.5	7.5	18	13	7	4.3	1.2	.9	.8
13	4.9	1.4	2.3	17	9	19	13	7.5	4.0	1.3	.9	.8
14	4.2	1.4	1.5	13	8	21	13	7	4.3	1.2	.9	.8
15	3.1	1.3	1.7	15	7	21	13	8	3.7	1.2	.9	.8
16	2.9	1.3	1.9	12	6.5	19	127	7.5	3.7	1.2	.9	.8
17	2.7	1.3	1.9	16	8	19	78	8	3.6	1.1	.9	.9
18	3.1	1.5	1.9	12	18	19	43	12	3.6	1.1	.9	.8
19	2.7	1.5	1.7	36	18	19	24	6.5	3.6	1.1	.9	.8
20	2.5	1.5	1.9	33	21	17	20	6.5	3.4	1.1	.9	.8
21	2.5	1.5	1.7	18	28	15	19	8.5	3.2	1.1	.9	.8
22	2.3	1.4	1.5	19	65	15	19	9	3.2	1.0	.9	.8
23	1.9	1.4	1.9	18	149	14	17	11	3.2	1.1	.9	.8
24	2.1	1.4	4.2	13	72	15	13	14	2.8	1.1	.9	.8
25	2.7	1.4	6	10	103	14	12	10	2.4	1.0	.9	.8
26	3.1	1.4	6.5	11	59	13	12	9	2.2	1.0	.8	.8
27	2.7	1.4	7.5	11	40	13	12	8.5	1.9	1.0	.8	.8
28	2.5	1.4	7	9.5	37	12	12	6	1.7	1.0	.8	.8
29	2.3	1.4	8	10	.....	13	12	5	1.4	1.0	.8	.8
30	2.1	1.4	9	8	.....	12	11	5.5	1.4	1.0	.8	.9
31	1.9	.....	9.5	7.5	.....	12	.....	6	.....	1.0	.8	.....

NOTE.—Gage not read Nov. 21-23; discharge interpolated.

Monthly discharge of Sweetwater River near Descanso, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	10	1	3.91	240
November	2.3	1.3	1.52	90.4
December	9.5	1.3	3.09	190
January	36	6.5	13.2	812
February	149	6.5	26.4	1,470
March	27	12	18.1	1,110
April	127	11	20.8	1,240
May	14	5	9.02	555
June	6	1.4	3.79	226
July	1.5	1.0	1.19	73.2
August	1.0	.8	.900	55.3
September	.9	.8	.843	50.2
The year	149	.8	8.44	6,110

SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER NEAR SANTEE, CALIF.

LOCATION.—In El Cajon grant, at Old Mission dam, below Spring Canyon and just above Oak Canyon, about 4½ miles west of Santee, San Diego County.

DRAINAGE AREA.—375 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 25, 1912, to September 30, 1917 (record not complete).

GAGE.—Staff in two sections; installed December 12, 1916; lower section is bolted to upstream face of old dam near left end; upper section fastened to large sycamore tree on left bank just above dam. Original location and datum have been maintained. Gage datum, 266.42 feet above sea level. Gage read by Thomas Netting.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet above gage, or by wading.

CHANNEL AND CONTROL.—Bed composed of sand; shifting. Old Mission dam serves as a partial control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.4 feet at 8 a. m. February 23 (discharge, determined from extension of rating curve, 1,040 second-feet); channel dry during July, August, and September except for a small amount of ground water rising to the surface at the dam.

1912–1917: Maximum stage recorded, 25.1 feet January 27, 1916 (discharge, 70,200 second-feet); stream practically dry for several months every year.

DIVERSIONS.—See Cuyamaca Water Co.'s flume near Lakeside. Water for irrigation is pumped from wells along the river above and below Lakeside.

REGULATION.—Water is stored at Cuyamaca reservoir on Boulder Creek.

ACCURACY.—Stage-discharge relation fairly permanent during period covered by record. Rating curve, used December 25 to June 30, fairly well defined below 200 second-feet. Gage read usually to half-tenths once a day. Daily discharge ascertained by applying gage height to rating table. Records fair.

COOPERATION.—Gage-height record obtained in cooperation with Charles Sampson, general manager La Mesa, Lemon Grove, and Spring Valley irrigation district.

Discharge measurements of San Diego River near Santee, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 19	W. J. Isbell	4.93	4.7	Mar. 12	F. C. Ebert	6.52	105
Jan. 22	F. C. Ebert	7.38	175	29	do	5.78	45
23	do	6.92	141	Apr. 18	McGlashan and Ebert	7.03	149
Feb. 15	do	5.72	39	20	do	6.40	85
19	do	6.95	146	May 23	F. C. Ebert	5.24	24
20	do	6.80	126	June 28	D. A. McClung	3.94	.3

Daily discharge, in second-feet, of San Diego River near Santee, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	89	65	170	47	50	33
2	.....	155	59	116	47	44	20
3	.....	116	53	84	42	42	19
4	.....	98	50	80	40	40	17
5	.....	80	44	80	33	37	16
6	.....	65	42	80	33	33	15
7	.....	72	42	80	33	30	14
8	.....	80	40	72	31	27	12
9	.....	72	37	89	37	40	9.5
10	.....	136	42	116	76	42	7.5
11	.....	50	40	89	59	33	6
12	.....	48	42	89	50	29	4.8
13	.....	47	42	80	50	27	4.0
14	.....	59	42	94	44	22	3.2
15	.....	126	42	89	37	19	3.0
16	.....	116	37	84	430	17	2.8
17	.....	116	89	80	340	16	2.6
18	.....	147	158	59	194	29	2.4
19	4.5	218	142	59	102	44	2.2
20	3.5	308	126	59	112	32	2.0
21	2.5	267	116	59	89	27	1.8
22	2.5	194	147	65	80	24	1.6
23	2.5	107	980	59	65	24	1.4
24	5	98	374	50	65	22	1.2
25	147	94	280	53	62	56	1.0
26	136	89	254	50	53	47	.8
27	107	89	218	53	47	40	.5
28	107	84	194	50	50	42	.3
29	107	80	.....	42	53	40	.2
30	107	72	.....	42	53	37	.1
31	107	68	.....	44	.....	35	.....

NOTE.—Gage not read Dec. 22-24, 28, 30; Jan. 2, 4, 7, 12; and June 15-30; discharge interpolated. No record Oct. 1 to Dec. 18, 1916. No flow July 1 to Sept. 30, 1917.

Monthly discharge of San Diego River near Santee, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
December 19-31	147	2.5	64.5	1,660
January	308	47	111	6,830
February	980	37	136	7,550
March	170	42	74.7	4,590
April	430	31	81.8	4,870
May	56	16	33.8	2,080
June	33	.1	6.83	406
July	0	.0	.0	0
August	0	.0	.0	0
September	0	.0	.0	0
The period	.....	.....	.....	28,000

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BOULDER CREEK AT CUYAMACA RESERVOIR, NEAR JULIAN, CALIF.

LOCATION.—In Cuyamaca grant, at outlet of Cuyamaca reservoir, 7 miles south of Julian, San Diego County, and 12 miles above mouth of Boulder Creek.

DRAINAGE AREA.—12.0 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 19, 1912, to September 30, 1917.

GAGE.—Vertical staff fastened to right side of weir box, 3½ feet above weir. Zero at elevation of crest of the 6-foot Cippoletti weir, which is 100 feet below outlet gates of reservoir. Gage read by watchman at dam.

DISCHARGE MEASUREMENTS.—Made by wading near weir. On account of velocity of approach it has been necessary to rate weir.

CHANNEL AND CONTROL.—Cippoletti weir acts as permanent control.

EXTREMES OF DISCHARGE.—Maximum daily discharge reported during year, 9.9, second-feet July 11; no water released from reservoir except when needed for Cuyamaca Water Co.'s flume.

1912–1917: Maximum daily discharge recorded, 1,877 second-feet, January 28, 1916.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by operation of outlet gate of reservoir. Cuyamaca dam, completed in 1886, was one of the first earth dams built in California to store water for irrigation. The dam was originally 35 feet high but in 1894 was enlarged, increasing the capacity of the reservoir to 11,400 acre-feet. The present dam is 635 feet long and 41½ feet high, with an inner slope of 2:1 and an outer slope of 1½:1. From the reservoir the water flows 12½ miles down the natural channel of Boulder Creek and San Diego River to the intake of Cuyamaca Water Co.'s flume.

ACCURACY.—Stage-discharge relation permanent except when changes are made in weir. Gage read daily to hundredths with additional observations when reservoir gates are changed. Records excellent when discharge does not exceed capacity of weir.

COOPERATION.—Record of daily discharge furnished by Cuyamaca Water Co

The following discharge measurement was made by D. A. McClung:
June 28, 1917: Gage height, 0.35 foot; discharge, 4.8 second-feet.

Daily discharge, in second-feet, of Boulder Creek at Cuyamaca reservoir, near Julian, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	June.	July.	Aug.	Sept.	Day.	Oct.	June.	July.	Aug.	Sept.
1	2.5	.....	6.9	9.1	8.9	16	.....	.....	7.2	7.8	8.9
2	.9	.....	6.9	9.1	8.9	17	.....	.....	7.2	7.8	8.9
3	.....	.....	6.9	9.1	8.9	18	.....	.....	7.2	7.8	8.9
4	.....	.....	6.9	9.1	8.9	19	.....	.....	7.2	7.8	8.9
5	.....	.....	6.9	8.6	8.9	20	.....	.....	7.7	7.8	8.9
6	.....	.....	6.9	7.8	8.9	21	.....	.....	9.1	8.2	8.9
7	.....	.....	7.5	7.8	8.9	22	.....	.....	9.1	8.9	8.9
8	.....	.....	8.3	7.8	8.9	23	.....	.....	9.1	8.9	8.9
9	.....	.....	8.3	7.8	8.9	24	.....	.....	9.1	8.9	8.9
10	.....	.....	9.3	7.8	8.9	25	.....	.....	9.1	8.9	8.9
11	.....	.....	9.9	7.8	8.9	26	.....	2.8	9.1	8.9	8.9
12	.....	.....	8.6	7.8	8.9	27	.....	2.8	9.1	8.9	8.9
13	.....	.....	8.5	7.8	8.9	28	.....	4.4	9.1	8.9	8.9
14	.....	.....	8.6	7.8	8.9	29	.....	5.0	9.1	8.9	8.9
15	.....	.....	7.2	7.8	8.9	30	.....	6.9	9.1	8.9	8.9
						31	.....	.....	9.1	8.9	.....

Monthly discharge of Boulder Creek at Cuyamaca reservoir near Julian, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2.5	0.0	0.11	6.8
June	6.9	.0	.73	43.4
July	9.9	6.9	8.20	504
August	9.1	7.8	8.36	514
September	8.9	8.9	8.90	530
The year	9.9	.0	2.21	1,600

NOTE.—No flow Oct. 3 to June 25.

CUYAMACA WATER CO.'S FLUME AT DIVERTING DAM NEAR LAKESIDE, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 14 S., R. 2 E., just below intake, at diverting dam about 13 miles northeast of Lakeside, San Diego County.

RECORDS AVAILABLE.—May 4, 1912, to September 30, 1917.

GAGE.—Vertical staff in a stilling box on outside of flume, about 1,000 feet below intake; installed April 8, 1916. Previous gage was similar but was 500 feet below intake and just above sand box. Datum has always been elevation of floor of flume. Gage read by employees of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—The flume is lined with tar paper to reduce leakage.

EXTREMES OF DISCHARGE.—Maximum daily discharge 1912–1917 was 51 second-feet, March 24, 1913. No flow for certain periods nearly every year.

ACCURACY.—Stage-discharge relation permanent throughout year. Rating curve well defined. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Cuyamaca Water Co.'s flume diverts water from San Diego River and receives through South Fork flume water from South Fork of San Diego River. The flume is 6 feet wide, 24 inches deep, and more than 30 miles long. It carries water into La Mesa reservoir, about 8 miles northeast of San Diego. This system supplied the city of San Diego with water until 1906, when the Southern California Mountain Water Co. extended its system to the city. Water was again furnished the city of San Diego after the floods, January, 1916. It now supplies water for irrigation of about 4,000 acres, and 7 per cent of the flow is used for domestic service. The Capitan Grande Indian Reservation has a water right of 0.8 second-foot from this flume.

Discharge measurements of Cuyamaca Water Co.'s flume at diverting dam near Lakeside, Calif., during the year ending Sept. 30, 1917.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 13	0.87	10.6
13	.40	2.3
22	.61	5.5

Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume at diverting dam near Lakeside, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.6	5.6	3.7	9.1	2.3	3.0	3.4	5.2	3.7	10	9.6	6.6
2	3.8	5.6	3.7	9.1	2.3	3.0	3.0	5.2	3.7	8.5	8.9	6.6
3	5.0	5.6	2.3	5.6	2.3	3.0	3.0	5.2	3.7	8.3	8.5	6.6
4	6.1	5.6	2.3	4.3	3.7	3.4	3.0	5.2	3.7	8.3	8.0	6.6
5	4.4	5.6	2.3	8.3	4.0	5.6	3.0	5.2	3.7	8.3	8.0	6.6
6	7.4	5.6	2.3	10	2.2	5.2	3.0	5.2	3.7	8.3	6.6	6.6
7	5.6	5.6	2.3	10	.0	3.7	3.0	5.2	3.7	10	6.1	6.5
8	3.5	5.6	2.3	10	.0	5.2	3.0	5.2	3.7	9.1	6.1	6.3
9	.0	5.6	2.3	10	.0	5.2	3.0	5.2	3.7	8.0	6.1	6.3
10	2.9	5.6	2.3	10	.0	5.2	3.0	5.2	4.4	7.4	6.1	6.6
11	4.9	5.6	2.3	9.8	.0	5.2	3.0	5.2	4.9	7.4	6.1	6.6
12	5.0	5.6	2.3	9.8	.7	5.2	3.0	5.2	4.9	8.7	6.1	6.1
13	5.2	5.6	2.4	4.0	1.0	5.2	3.0	5.2	6.8	9.6	6.1	5.6
14	5.2	5.6	2.6	5.0	1.0	5.2	2.0	5.2	8.7	9.3	6.1	5.2
15	5.2	5.4	2.6	4.0	1.0	5.2	1.0	5.2	11.5	8.0	6.1	5.4
16	5.2	5.4	2.6	4.0	3.7	5.2	2	5.2	12.5	7.6	6.1	5.6
17	5.2	5.6	2.6	2.1	3.7	5.2	.7	5.2	9.8	7.0	5.9	5.6
18	5.2	5.6	2.6	1.4	2.3	5.2	3.1	5.2	8.7	7.0	5.6	5.6
19	5.2	5.6	2.6	1.4	2.3	5.2	3.1	5.2	8.5	9.3	5.6	5.6
20	5.2	5.6	2.6	5.6	2.3	5.2	3.1	5.2	7.6	7.6	5.6	5.6
21	5.2	5.6	2.6	5.6	3.3	4.8	3.1	5.2	7.6	7.8	6.3	6.5
22	5.2	5.6	3.8	5.2	3.7	3.7	3.1	5.2	7.2	7.6	6.8	6.8
23	5.2	5.6	4.0	3.3	2.1	3.7	3.1	5.2	6.8	7.8	6.8	6.8
24	5.2	5.6	4.6	3.0	2.7	3.7	3.1	5.2	6.5	8.0	6.8	6.8
25	5.2	5.6	1.8	3.0	3.0	3.3	3.1	5.2	6.1	8.5	6.8	7.0
26	5.2	5.6	5.2	2.9	3.0	4.8	3.1	5.2	4.9	8.0	6.8	7.0
27	5.2	4.3	5.2	3.0	3.0	6.1	3.1	3.7	5.0	8.5	6.8	6.8
28	5.7	3.7	9.1	3.0	3.0	6.1	3.1	3.7	7.0	10.5	6.6	6.3
29	5.6	3.7	9.1	3.0	.....	6.1	4.4	3.7	7.6	8.9	6.6	6.1
30	5.6	3.7	9.1	3.0	.....	4.9	5.2	3.7	9.1	8.5	6.6	6.1
31	5.6	.....	9.1	2.6	.....	4.4	.....	3.7	.....	11	6.6	.....

Monthly discharge of Cuyamaca Water Co.'s flume at diverting dam near Lakeside, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	7.4	0.0	4.99	307
November	5.6	3.7	5.35	318
December	9.1	1.8	3.70	228
January	10	1.4	5.52	339
February	4.0	.0	2.09	116
March	6.1	3.0	4.71	290
April	5.2	.2	2.90	173
May	5.2	3.7	4.96	305
June	12.5	3.7	6.31	375
July	11	7.0	8.48	521
August	9.6	5.6	6.67	410
September	7.0	5.2	6.28	374
The year	12.5	.0	5.19	3,760

CUYAMACA WATER CO.'S FLUME NEAR LAKESIDE, CALIF.

LOCATION.—At patrolman's cabin, half a mile above trestle crossing at Los Coches Creek, 3 miles southeast of Lakeside, San Diego County, and about 20 miles below intake on San Diego River.

RECORDS AVAILABLE.—January 1, 1907, to September 30, 1917.

GAGE.—Vertical staff in a stilling box fastened to outside of flume just below patrolman's cabin at same site as water-stage recorder used in previous years. Position of gage has been changed slightly several times since station was first established, but datum has always been same as elevation of floor of flume. Gage read by an employee of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume near gage.

CHANNEL AND CONTROL.—In the fall of 1914 the flume was deepened 8 inches and more tar-paper lining was put in. Elevation of flume appears to vary slightly with quantity of water flowing.

EXTREMES OF DISCHARGE.—Maximum daily discharge, 1907–1917, was 24 second-feet, May 10–12, 1916. No flow at certain times nearly every year.

DIVERSIONS.—Water is diverted into the flume from South Fork of San Diego River and a small quantity is diverted from this flume at Capitan Grande Indian Reservation above station.

ACCURACY.—Stage-discharge relation not permanent throughout the year owing to poor condition of tar-paper lining and growth of moss in flume. Two fairly well defined rating curves were used throughout the year except for period March 29 to May 22. Gage read to hundredths three times daily. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method. Records fair.

See description of Cuyamaca Water Co.'s flume at diverting dam near Lakeside, Calif., page 19.

Discharge measurements of Cuyamaca Water Co.'s flume near Lakeside, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 15	W. J. Isbell	0.69	6.5	Apr. 18	McGlashan and Ebert	0.51	2.8
Feb. 14	F. C. Ebert	.50	3.3	May 23	F. C. Ebert	.71	7.0
Mar. 28	do	.70	6.5				

Daily discharge, in second-feet, of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13.5	5.9	5.7	7.6	1.9	2.2	7.4	5.9	5.2	9.5	11	5.9
2	11	5.9	6.2	7.4	1.2	2.1	5.5	6.2	5.2	11	10.5	5.9
3	2.6	6.1	5.7	7.0	1.7	2.1	5.2	6.2	5.2	7.8	10	6.1
4	5.7	7.2	5.7	2.2	1.8	2.1	5.5	6.4	5.2	8.4	10	5.7
5	2.8	5.7	5.7	5.0	3.6	3.2	5.5	5.9	5.0	8.0	8.4	5.5
6	5.5	6.6	5.9	7.0	3.0	5.2	5.7	7.2	5.0	8.0	8.0	6.1
7	3.8	6.6	5.7	7.0	3.3	3.3	5.5	5.9	5.2	9.5	8.7	5.7
8	5.5	6.6	5.2	7.0	3.8	4.0	5.5	6.2	5.0	9.3	6.8	5.5
9	5.9	6.4	4.8	8.0	3.9	5.7	5.9	6.8	5.2	8.0	6.1	5.4
10	4.4	5.9	7.4	7.8	3.9	4.6	6.2	6.6	5.2	7.6	5.7	5.2
11	4.5	6.1	4.0	8.8	3.4	9.9	5.3	6.4	5.5	6.3	5.9	5.4
12	5.2	6.2	4.5	8.6	3.6	4.5	5.2	6.4	5.7	5.9	5.7	4.8
13	4.4	6.1	3.6	2.4	3.4	4.4	5.5	6.6	5.7	8.4	5.9	5.0
14	4.5	6.2	4.6	3.3	3.3	4.5	5.2	6.6	7.2	9.3	6.4	4.3
15	5.2	5.9	5.5	3.8	3.8	4.5	2.9	6.4	13	9.1	6.3	5.4
16	5.2	5.9	5.9	5.2	3.4	4.5	4.2	6.1	13.5	8.2	6.4	5.2
17	4.4	6.1	5.0	2.8	3.4	4.6	1.9	5.9	9.3	8.0	6.1	5.5
18	5.2	6.1	4.6	1.3	2.8	4.6	2.7	7.6	8.4	8.0	5.9	5.4
19	3.3	6.1	5.3	3.8	2.1	4.8	2.8	5.5	8.7	6.8	5.4	5.4
20	3.2	6.4	5.3	4.4	2.0	5.0	2.8	5.9	8.2	6.8	5.4	5.5
21	3.4	6.6	5.9	4.5	2.0	4.5	2.6	6.8	7.2	7.4	5.0	5.7
22	3.6	6.2	6.6	4.4	3.2	3.3	3.3	6.6	7.0	8.4	5.9	5.5
23	5.5	6.4	5.9	4.4	2.3	3.3	4.0	6.8	6.4	10	6.4	5.5
24	6.1	6.1	6.2	2.3	1.9	3.3	3.8	7.2	5.5	9.3	6.6	6.3
25	5.7	6.2	3.0	2.1	2.5	3.2	4.0	7.2	5.4	9.5	6.4	*6.1
26	6.1	6.4	3.4	2.0	2.4	2.9	4.0	7.4	5.2	9.5	6.1	6.4
27	5.7	6.4	5.5	2.0	2.3	5.0	4.0	5.7	4.0	8.0	5.9	5.5
28	3.4	5.5	6.1	3.0	2.2	6.4	4.0	5.3	6.4	9.3	6.4	5.9
29	5.7	5.7	7.4	2.8	.....	7.6	4.8	5.3	7.2	10	6.1	5.7
30	5.7	5.5	7.4	2.5	.....	7.8	5.7	5.7	8.4	10	6.1	5.7
31	5.7	.....	7.2	2.6	.....	7.8	.....	5.5	.....	.....	6.3	.....

NOTE.—No record July 31; flume probably dry.

Monthly discharge of Cuyamaca Water Co.'s flume near Lakeside, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	13.5	2.6	5.24	322
November	7.2	5.5	6.17	367
December	7.4	3.0	5.51	339
January	8.8	1.3	4.61	283
February	3.9	1.2	2.79	155
March	9.9	2.1	4.55	280
April	7.4	1.9	4.55	271
May	7.6	5.3	6.33	389
June	13.5	4.0	6.64	395
July	11	.0	8.24	507
August	11	5.0	6.83	420
September	6.3	4.3	5.57	331
The year	13.5	0.0	5.61	4,060

SAN DIEGUITO RIVER BASIN.

SANTA YSABEL CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ sec. 21, T. 12 S., R. 2 E., at Sutherland dam site, about 1 mile below Sutherland, 1½ miles above mouth of Black Canyon Creek, and 4½ miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—53.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 29, 1912, to September 30, 1917.

GAGE.—Friez water-stage recorder on right bank just above Sutherland dam site. Gage datum was lowered 0.21 foot on October 12, 1916, on account of change in control. Previous gages have been at same site but original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. A concrete control has been constructed at an outcropping of bedrock 20 feet below gage. This control was repaired November 6–9, 1916. Banks high, covered with brush, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.17 feet at 1 a. m. February 23 (discharge, 510 second-feet); minimum stage from water-stage recorder, 1.05 feet at 7 p. m. September 2 (discharge, 0.3 second-foot).

1912–1917: Maximum stage recorded, 11.0 feet January 27, 1916 (discharge, 21,100 second-feet); stream dry October 1–2, 1913; August 12–29 and September 6–13, 1914.

DIVERSIONS.—None of any importance above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently during the year owing to deposition of sand or its scouring out at the control. Control was repaired November 6–9. Several well-defined rating curves used. Operation of water-stage recorder satisfactory throughout the year. Daily discharge, except that for October 1–11 (estimated from measurements) and November 6–9 (interpolated), ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Records fair.

Discharge measurements of Santa Ysabel Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	S. L. R. Case	1.16	8.8	Mar. 7	D. A. McClung	1.70	41
19	W. J. Isbell	1.14	6.2	9	F. C. Ebert	1.72	45
Dec. 1	Isbell and McClung	1.37	5.8	20	D. A. McClung	1.63	32
9	F. C. Ebert	1.34	7.8	27	F. C. Ebert	1.58	23
21	McClung and Case	1.35	6.2	Apr. 13	McClung and Holley	1.52	23
Jan. 2	D. A. McClung	1.41	12	19	McGlashan and Ebert	1.67	35
21	F. C. Ebert	1.86	54	May 21	F. C. Ebert	1.48	16
Feb. 13	McClung and Dubois	1.50	17	June 7	D. A. McClung	1.42	16
18	F. C. Ebert	1.73	42	29	....do	1.30	6.6
23	T. B. Dubois et al	2.78	345	Aug. 20	McClung and Rogers	1.16	1.5
27	McClung and Dubois	1.97	91				

Daily discharge, in second-feet, of Santa Ysabel Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	5.5	6.5	13	25	72	20	19	21	4.3	4.8	0.5
2	30	5.5	9	12	25	65	19	18	20	5.5	4.8	.5
3	11	5.5	13	88	17	54	18	16	21	7	4.8	3.4
4	9	5.5	11	39	18	54	15	15	21	8	4.8	1.4
5	8.5	9.5	8	21	18	54	14	16	21	7	4.8	2.5
6	11	9	8.5	16	17	51	15	16	21	7	3.8	2.5
7	6.5	8	7.5	13	16	45	16	17	21	7	3.4	2.3
8	7	7	6	11	17	41	15	22	21	7	3.0	2.3
9	7.5	6	7	11	17	46	31	22	20	6.5	2.5	2.1
10	9	5.5	6.5	9	17	70	31	21	15	6.5	2.5	1.9
11	8	6.5	5.5	10	17	61	21	19	14	6	3.4	1.9
12	13	6.5	5.5	12	18	52	19	16	14	5	3.4	1.9
13	5.5	5.5	6.5	32	17	48	19	16	13	2.5	3.4	2.1
14	5.5	6	6	19	16	50	19	15	13	4.8	3.0	2.3
15	4.8	5	5.5	35	16	48	21	14	12	6	2.3	1.7
16	4.6	5.5	7	35	15	42	86	14	12	5.5	2.5	1.6
17	5	5.5	6.5	23	50	40	68	14	13	6	2.3	1.6
18	5.5	5.5	6.5	39	55	38	42	28	13	5	2.3	1.6
19	5.5	5	6.5	72	77	35	35	22	12	4.8	2.3	1.7
20	5	7	7.5	72	86	35	28	19	8.5	2.1	2.3	12
21	5	5.5	7.5	54	64	30	27	17	9	3.8	2.5	3.0
22	4.8	6	7	44	204	27	26	17	6	3.4	1.9	1.9
23	5.5	7	8	36	294	25	24	19	6	3.4	2.3	2.1
24	6.5	7	31	32	162	25	22	36	7.5	6.5	2.1	2.5
25	4.8	7.5	48	29	165	25	20	43	7.5	5	2.3	2.3
26	4.6	8	27	29	118	24	20	34	7.5	4.8	2.1	1.9
27	5.5	7.5	23	28	96	23	27	29	6	6.5	1.9	1.4
28	5.5	7.5	14	31	83	21	28	28	6	6	.8	1.4
29	6.5	6	14	30	.....	21	27	29	4.8	5.5	.6	1.4
30	7	6	14	28	.....	21	22	30	3.4	5.5	.5	1.7
31	6.5	.....	14	27	.....	22	.....	27	.....	6	.5	.....

Monthly discharge of Santa Ysabel Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 53.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	30	4.6	7.87	0.147	0.17	484
November	9.5	5	6.43	.120	.13	383
December	48	5.5	11.4	.213	.25	701
January	88	9	30.6	.573	.66	1,880
February	294	15	62.1	1.16	1.21	3,450
March	72	21	40.8	.764	.88	2,510
April	86	14	26.5	.496	.55	1,580
May	43	14	21.5	.403	.46	1,320
June	21	3.4	13.0	.243	.27	774
July	8	2.1	5.48	.103	.12	337
August	4.8	.5	2.71	.051	.06	167
September	12	.5	2.25	.042	.05	134
The year	294	.5	19.0	.356	4.81	13,700

SANTA YSABEL CREEK NEAR RAMONA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 27, T. 12 S., R. 1 E., at Pamo dam site at lower end of Pamo Valley, 1½ miles below mouth of Temescal Creek, and about 4½ miles north of Ramona, San Diego County.

DRAINAGE AREA.—110 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1912, to September 30, 1917.

GAGE.—Leitz water-stage recorder, with concrete well and house, on left bank at dam site; in operation January 22 to 30, 1917; vertical staff fastened to outside of gage well, known as gage "C," was used December 8 to January 21, and July 1 to September 30, 1917. Gage "B" is a vertical staff fastened to solid rock on left bank a short distance above gage "C," installed January 31, 1916; it was used October 1 to December 7, 1916. Gage read by C. M. DeVenelle. Original gage was a staff in four sections on left bank, one-half mile upstream, with a short vertical section at concrete control.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 1,000 feet above gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. Banks high and clean; channel straight for 200 feet above and 600 feet below gage. Concrete control built across channel just below gage was completed December 8, 1916. It was only partly effective during high water as a large boulder in the channel a few feet upstream caused a sand bar to form at control. This boulder was removed in September, 1917.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.55 feet at 1 a. m. February 23 (discharge, determined from extension of rating curve, 2,540 second-feet); minimum stage, 1.05 feet at 7 p. m. September 2 (discharge, 0.3 second-foot).

1912–1917: Maximum stage recorded, 14.0 feet at 7 p. m. January 27, 1916 (discharge, 28,400 second-feet); minimum stage, 0.74 foot October 1–6, 1915 (discharge, 0.1 second-foot).

DIVERSIONS.—None of any importance above the station. Water is diverted from Santa Ysabel Creek near mouth of canyon, 5 miles below the station, by East San Pasqual ditch, which takes out on the left bank, and West San Pasqual ditch, which takes out on the right bank below the intake of the East San Pasqual.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent during year on account of formation of sand bar above control. Fairly well-defined rating curves used December 8–23; January 3–18; April 16 to May 17; and May 24 to September 30. For these periods, daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting gage-height graph. Discharge October 1 to December 7 estimated from discharge measurements and record for Mesa Grande. For remainder of year, not covered by rating curves, discharge was computed by shifting-control method and from curves covering short periods. October 1 to January 21 and July 1 to September 30 gage read to hundredths twice daily. Records fair for periods covered by rating curves; remainder of record roughly approximate.

Discharge measurements of Santa Ysabel Creek near Ramona, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	S. L. R. Case	0.58	24	Feb. 27	D. A. McClung	2.45	145
17	do	.65	12	Mar. 8	McClung and Dean	2.34	61
18	W. J. Isbell	.64	15	9	F. C. Ebert	2.33	66
Dec. 1	Isbell and McClung	.42	12	21	D. A. McClung	2.17	52
8	F. C. Ebert	1.64	12	28	F. C. Ebert	2.02	42
18	D. A. McClung	1.69	11	Apr. 13	McClung and Holley	1.78	30
22	McClung and Case	1.73	13	18	McGlashan and Ebert	2.06	70
25	D. A. McClung	1.60	66	May 21	F. C. Ebert	1.82	33
27	McClung and Case	1.47	28	June 8	D. A. McClung	1.77	23
Jan. 19	F. C. Ebert	2.56	164	29	do	1.55	6.5
21	do	2.18	102	Aug. 20	McClung and Gavin	1.40	2.4
Feb. 13	D. A. McClung	1.78	27	Sept. 4	McClung and Campbell	1.29	.8
18	F. C. Ebert	1.76	80				

NOTE.—Measurements Oct. 7 to Dec. 1 refer to gage "B"; remainder of measurements refer to gage "C."

Daily discharge, in second-feet, of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25	11	12	75	25	95	35	33	29	8	5	1.2
2	50	11	18	80	30	80	30	33	26	7.5	4.8	1.2
3	30	11	25	131	32	70	28	33	23	7.5	4.5	.9
4	20	12	20	80	28	80	26	29	21	7.5	4.0	.9
5	20	15	16	45	26	75	26	29	20	7.5	3.0	1.2
6	30	15	17	23	25	70	27	30	20	7.5	2.5	1.2
7	25	14	15	21	26	65	29	34	20	7.5	2.5	1.3
8	20	13	11	23	27	60	27	30	19	7	2.5	1.0
9	20	13	12	23	25	65	34	34	18	6.5	2.4	.7
10	25	12	12	21	26	110	45	32	18	6.5	3.5	.9
11	20	12	12	21	25	70	34	29	16	6	3.5	.9
12	20	12	15	24	27	60	33	26	16	4.8	3.5	.9
13	15	11	15	60	27	60	32	25	15	4.5	3.2	1.3
14	12	11	9	30	25	60	32	23	13	4.0	3.0	1.3
15	10	11	10	37	25	60	32	22	11	4.0	2.4	1.0
16	10	12	11	101	25	60	235	22	10	4.0	2.4	.9
17	12	11	12	50	80	60	128	18	9.5	4.5	2.4	.6
18	15	11	12	83	90	55	68	38	8.5	4.2	2.4	.6
19	13	13	13	170	100	50	57	39	8.5	4.0	2.4	.5
20	10	15	14	140	125	47	47	33	8	4.0	2.2	4.0
21	10	14	16	116	120	48	43	33	8	3.8	2.2	55
22	9	13	15	80	700	49	39	32	7.5	4.0	2.0	2.9
23	11	13	12	50	1,130	49	34	32	7	4.2	2.2	1.7
24	13	14	260	50	205	50	33	48	6.5	8	2.2	1.8
25	9	15	102	47	235	47	32	71	7	6	2.0	1.6
26	9	15	40	44	170	43	32	45	6.5	5.5	1.9	2.0
27	11	15	35	41	135	41	47	36	6.5	6.5	1.8	2.0
28	11	15	36	38	115	40	40	32	6.5	5.5	1.6	1.7
29	13	12	39	33	.....	36	47	33	7	5	1.8	1.6
30	14	11	48	23	.....	39	39	32	7.5	5	1.4	1.6
31	13	.....	55	22	.....	40	.....	32	.....	5	1.3	.....

NOTE.—Gage not read Jan. 13; discharge estimated.

Monthly discharge of Santa Ysabel Creek near Ramona, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 110 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	50	9	16.9	0.154	0.18	1,040
November	15	11	12.8	.116	.13	762
December	260	9	30.3	.275	.32	1,860
January	170	21	57.5	.523	.60	3,540
February	1,130	25	130	1.18	1.23	7,220
March	110	36	59.2	.538	.62	3,640
April	235	26	46.4	.422	.47	2,760
May	71	18	32.8	.298	.34	2,020
June	29	6.5	13.3	.121	.14	791
July	8	3.8	5.66	.051	.06	348
August	5	1.3	2.66	.024	.03	164
September	55	.5	3.15	.029	.03	187
The year	1,130	.5	33.6	.305	4.15	24,300

SAN DIEGUITO RIVER NEAR BERNARDO, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 18, T. 13 S., R. 2 W., at Carroll dam site, 5½ miles below Bernardo bridge, about 10½ miles above mouth of river and 4 miles southwest of Bernardo, San Diego County.

DRAINAGE AREA.—299 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 17, 1916, to September 30, 1917.

GAGE.—Vertical staff in four sections on right bank at dam site; read by E. A. Bartl and E. W. Case. Zero of gage 214 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading near gage.

CHANNEL AND CONTROL.—Shifting sand with bed rock outcropping about 400 feet below gage; fairly permanent except during low stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.50 feet at 7 a. m. February 23 (discharge, 1,410 second-feet); stream dry June 30 to September 30.

1916–1917: Maximum stage recorded, 21.2 feet 1 to 3 p. m. January 27, 1916 (discharge, 72,100 second-feet); no flow July 30 to September 30, 1916, and June 30 to September 30, 1917.

DIVERSIONS.—East and West San Pasqual ditches divert water from this stream for irrigation in San Pasqual Valley. There are also several pumping plants in this valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent except for short periods during year. Changes in control fairly well defined by frequent discharge measurements. Fairly well defined rating curves used October 3 to December 1, January 3–18, and May 9–June 29. Gage read to hundredths twice daily; frequent readings during high water. Daily discharge for periods covered by rating curves ascertained by applying gage height to rating table; discharge for remainder of year computed by shifting-control method from rating curves covering short periods. Records October to May good for channel of this type; records for June only fair, as no measurements were made during the month.

Discharge measurements of San Dieguito River near Bernardo, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	E. A. Bartl	0.58	17	Feb. 22	F. C. Ebert	1.84	159
3	W. J. Isbell	.96	75	23	Ebert and Bartl	4.41	1,400
13	E. A. Bartl	.64	27	23	do	4.17	1,210
21	do	.57	19	24	E. A. Bartl	2.80	340
28	do	.42	11	25	do	2.64	290
Nov. 4	do	.40	7.5	Mar. 1	do	2.02	142
9	do	.40	6.8	5	do	1.67	100
19	do	.46	13	10	Bartl and Hayes	1.60	107
25	do	.48	14	10	Ebert and Bartl	1.78	178
Dec. 3	do	.54	29	11	do	1.64	112
16	do	.48	19	17	E. A. Bartl	1.28	64
27	do	1.70	119	30	do	1.00	42
31	do	1.08	38	Apr. 8	do	.68	15
Jan. 7	do	1.14	39	10	do	.91	54
15	do	1.33	80	12	do	.83	32
18	do	1.46	108	16	do	.99	72
19	do	2.6	602	17	do	2.37	349
21	do	2.45	309	18	do	1.73	126
22	do	2.06	191	20	do	1.43	65
27	do	1.46	78	23	do	1.20	59
Feb. 1	do	1.30	60	29	do	1.16	61
4	do	1.17	41	May 17	E. W. Case	.59	6.3
10	do	1.09	42	21	Case and Grem	.91	37
18	do	1.96	235	28	Hayes and Case	.94	49
21	F. C. Ebert	1.78	124				

Daily discharge, in second-feet, of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	6.5	11	13	30	56	130	33	40	38
2	17	10	26	30	50	120	30	31	29
3	89	9	29	139	47	110	27	25	26
4	48	7.5	36	218	43	105	24	21	21
5	19	10	33	92	42	100	22	23	21
6	52	12	32	57	42	86	20	17	22
7	45	13	28	41	42	66	17	15	20
8	38	10	24	35	41	66	14	14	19
9	32	7	23	31	41	66	14	35	18
10	31	8	22	26	40	150	53	42	15
11	30	7	21	23	40	125	53	36	14
12	28	8	20	100	39	108	33	31	10
13	27	13	22	189	38	88	24	30	8
14	27	12	20	87	37	83	25	21	4.3
15	27	11	17	70	35	80	25	14	2.8
16	26	10	18	152	31	76	260	6	2.0
17	24	11	20	97	90	68	315	4.2	1.4
18	23	14	18	114	232	66	123	11	1.2
19	21	13	20	555	197	64	82	46	.6
20	21	13	20	535	170	62	64	36	.7
21	21	14	20	325	140	59	47	34	.6
22	20	13	19	180	160	57	52	26	.6
23	19	11	19	120	1,240	55	58	22	.5
24	20	13	22	95	360	52	55	31	.5
25	17	13	310	85	285	50	48	90	.5
26	13	15	380	80	260	48	44	79	.4
27	12	13	120	76	225	45	41	61	.4
28	11	11	65	72	175	43	60	50	.3
29	12	12	45	68	.....	41	61	43	.2
30	11	14	40	64	.....	39	52	42	.0
31	11	.....	38	60	.....	36	.....	40	.....

Monthly discharge of San Dieguito River near Bernardo, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	89	6.5	25.8	1,590
November	15	7	11.2	666
December	380	13	49.7	3,060
January	555	23	124	7,620
February	1,240	31	150	8,330
March	150	36	75.6	4,650
April	315	14	59.2	3,520
May	90	4.2	32.8	2,020
June	38	.0	9.27	552
The year	1,240	.0	44.2	32,000

NOTE.—No flow June 30 to Sept. 30.

BLACK CANYON CREEK NEAR MESA GRANDE, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 12 S., R. 2 E., 1 mile above junction with Santa Ysabel Creek and about 4 miles southwest of Mesa Grande, San Diego County.

DRAINAGE AREA.—15.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 14, 1913, to August 20, 1917. (Discharge measurements only except for 1913–14 and January to March, 1917.)

GAGE.—Inclined staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Solid rock and boulders.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during period. Rating curve well defined below 25 second-feet. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Black Canyon Creek near Mesa Grande, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	W. J. Isbell	0.96	1.2	Mar. 27	F. C. Ebert		4.7
Feb. 13	D. A. McClung	1.07	3.9	Apr. 13	McClung and Holley		4.9
18	F. C. Ebert	1.40	10	19	McGlashan and Ebert		9.7
Mar. 7	D. A. McClung	1.30	8.4	June 29	D. A. McClung		1.2
9	E. A. Bartl		11	Aug. 20	McClung and Campbell	0.69	.05
20	D. A. McClung		7.1				

Daily discharge, in second-feet, of Black Canyon Creek near Mesa Grande, Calif., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1				11		4.0		21			
2			16	12		3.9		22		152	
3				13		4.0		23	10	77	7
4				14				24			
5				15				25			
6		4.0		16	13		9	26		18	
7	3.5	3.8	8.5	17				27			4.7
8		3.8		18		10		28			
9		3.9	11	19		13		29			
10		3.9		20		32	7	30	6		8
								31			

GUEJITO CREEK NEAR ESCONDIDO, CALIF.

LOCATION.—In northwest corner sec. 35, T. 12 S., R. 1 W., at highway bridge on road through San Pasqual Valley from Escondido to Ramona, one-fourth mile above junction with Santa Ysabel Creek and about 7 miles southeast of Escondido, San Diego County.

DRAINAGE AREA.—27.6 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 8 to September 30, 1915; October 1, 1916, to September 30, 1917.

GAGE.—Vertical staff fastened to downstream face of right wing wall of bridge; read by Everett Peet. Gage used before December 25, 1916, was on same bank 15 feet above bridge; datum 1.0 foot higher than that for present staff.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Sand; shifting. At high stages capacity of channel at bridge is not sufficient to carry all the water, which therefore overflows the highway at several points. There is backwater from Santa Ysabel Creek at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.0 feet February 22 (discharge, 55 second-feet); stream dry for several months during year.

DIVERSIONS.—There is a small ditch which diverts water for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. No rating curve developed. Gage usually read to hundredths once daily. Gage heights poor index of discharge. Daily discharge obtained from discharge measurements and by comparison with record of flow on Santa Maria Creek near Ramona. Records roughly approximate.

Discharge measurements of Guejito Creek near Escondido, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	W. J. Isbell	0.14	1.3	Mar. 9	Ebert and Bartl	0.80	4.0
Dec. 21	F. C. Ebert	.07	1.5	10	do	.80	7.3
Jan. 17	do	.85	3.2	20	D. A. McClung	.80	3.6
22	D. A. McClung	.87	7.8	28	F. C. Ebert	.75	1.8
23	E. A. Bartl	.81	6.7	Apr. 12	McClung and Holly	.72	2.6
Feb. 12	D. A. McClung	.80	2.4	18	E. A. Bartl	.81	5.2
13	F. C. Ebert	.82	2.9	May 21	F. C. Ebert	.76	1.7
19	E. A. Bartl	.85	11	June 8	D. A. McClung	.77	.7
26	D. A. McClung	.90	11	29	do		Dry.

Daily discharge, in second-feet, of Guejito Creek near Escondido, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1	1.5	3.5	6	1.5	5	2
2	1.5	1.5	3.5	5	1	4	1.5
3	1.5	5	3.5	4	1	3	1.5
4	1	3	3	4	1	3	1
5	1	2	3	3.5	.5	3	1
6	1	2	3	3	.5	2	1
7	1	1.5	3	3	.5	1.5	.8
8	1	1.5	3	3	1	1.5	.7
9	1	1.5	3	4	4	3	.6
10	1	1.5	2.5	7.5	3	5	.5
11	1	1.5	2.5	6.5	3	4	.4
12	1	2	2.5	6	2.5	2	.3
13	1	2.5	3	5	2	1	.2
14	1	2	3	5	2.5	1	.2
15	1	3.5	2	5	3	1	.1
16	1	4	1.5	4	10	1	.1
17	1	3	8	3.5	7	1	.....
18	1	6	15	3.5	5	3	.....
19	1	27	11	3.5	3	2.5	.....
20	1	20	10	3.5	2.5	1.5	.....
21	1.5	15	11	3.5	2	1.5	.....
22	2	8	40	3	1.5	1.5	.....
23	1.5	7	23	2.5	1.5	1.5	.....
24	5	5	14	2	1	2	.....
25	12	4	13	2	1	4	.....
26	5	4	11	2	1.5	3	.....
27	4	4	8	2	7	2	.....
28	2	4	7	2	8	1.5	.....
29	1.5	3.5	.....	2	7	1.5	.....
30	1.5	3.5	.....	1.5	6	2	.....
31	1.5	3.5	.....	1.5	.....	2	.....

NOTE.—No flow June 17 to Sept. 30.

Monthly discharge of Guejito Creek near Escondido, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	.....	.....	1.5	92
November	.....	.....	1.5	89
December	12	1	1.89	116
January	27	1.5	4.97	306
February	40	1.5	7.73	429
March	7.5	1.5	3.63	223
April	10	.5	3.03	180
May	5	1	2.31	142
June	2	.0	.40	24
July	.0	.0	.00	0
August	.0	.0	.00	0
September	.0	.0	.00	0
The year	40	.0	2.21	1,600

NOTE.—Discharge for October and November estimated.

SANTA MARIA CREEK NEAR RAMONA, CALIF.

LOCATION.—In SE. ¼ sec. 11, T. 13 S., R. 1 W., about 7 miles below mouth of Hatfield Creek and 5½ miles west of Ramona, San Diego County.

DRAINAGE AREA.—57.3 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 6, 1912, to September 30, 1917.

GAGE.—Friez water-stage recorder with concrete well and house on left bank just above control.

DISCHARGE MEASUREMENTS.—Made from cable 370 feet below gage, or by wading.

CHANNEL AND CONTROL.—Shifting sand above and below station. Concrete control just below gage at an outcropping of solid rock was rebuilt during summer of 1916. Stage of zero flow about 1.70 feet on gage. Left bank high; right bank sloping; one channel at all stages. Valley narrows to a rocky gorge at proposed dam site about 1,000 feet below gage. On this account there is natural storage in the channel during extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.03 feet at 7 a. m. February 23 (discharge, 118 second-feet); stream dry June 8 to September 30.

1912–1917: Maximum stage recorded, 15.9 feet at 5 p. m. January 27, 1916 (discharge, 7,140 second-feet); stream dry for several months each year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except December 30 to January 5 and February 25 to March 2. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except February 23, when hourly discharge was averaged. Records good.

Discharge measurements of Santa Maria Creek near Ramona, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	W. J. Isbell	1.70	0.05	Feb. 17	F. C. Ebert	2.45	32
Dec. 1	Isbell and McClung	1.71	.02	Mar. 10	do	2.23	10
26	McClung and Case	2.28	14	20	D. A. McClung	2.09	5.2
29	do	2.09	4.0	28	F. C. Ebert	2.01	2.0
Jan. 18	F. C. Ebert	2.25	13	Apr. 12	McClung and Holly	1.94	1.4
19	do	2.77	76	19	McGlashan and Ebert	2.12	6.0
Feb. 12	McClung and Castinien	2.09	3.9	June 7	D. A. McClung	1.71	.06
16	F. C. Ebert	2.06	2.6	28	do	1.69	0

Daily discharge, in second-feet, of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	0.1	0.1	4.3	6.5	12	1.1	1.4	0.9
2	.....	.1	.1	4.3	4.8	10	.8	1.1	.2
3	.....	.1	.1	4.3	4.4	8.5	.7	.9	.1
4	.....	.1	.1	4.4	3.4	8	.4	.9	.1
5	.....	.1	.1	4.4	3.6	7.5	.3	.8	.1
6	.....	.1	.1	4.4	3.6	7	.2	.3	.1
7	.....	.1	.1	3.9	3.4	5.5	.1	.2	.1
8	.....	.1	.1	3.2	3.2	5.5	.2	.2	.0
9	.....	.1	.1	2.6	3.4	6.5	.8	.7	.....
10	.....	.1	.1	1.6	3.4	11	1.5	1.4	.....
11	.....	.1	.1	1.6	2.9	8.5	1.3	1.1	.....
12	.....	.1	.1	3.4	3.4	7.5	1.0	.5	.....
13	.....	.1	.1	22	3.4	5.5	.8	.2	.....
14	.....	.1	.1	7	3.4	5.5	1.0	.2	.....
15	.....	.1	.1	7	2.6	5.5	1.6	.2	.....
16	.....	.1	.1	18	2.2	4.4	16	.1	.....
17	.....	.1	.1	9.5	18	3.6	21	.1	.....
18	.....	.1	.1	17	42	3.6	6.5	.3	.....
19	.....	.1	.1	83	31	3.6	3.9	.5	.....
20	.....	.1	.1	57	16	3.6	2.9	.2	.....
21	.....	.1	.1	42	13	3.6	2.6	.2	.....
22	0.1	.1	.1	22	16	3.4	1.9	.2	.....
23	.1	.1	.1	15	82	2.6	1.5	.2	.....
24	.1	.1	1.4	11	26	2.4	1.4	1.3	.....
25	.1	.1	26	8.5	23	2.4	1.4	2.9	.....
26	.1	.1	12	8.5	20	2.4	1.9	2.4	.....
27	.1	.1	15	8.5	17	2.2	10	1.2	.....
28	.1	.1	4.4	8.5	14	1.9	12	.9	.....
29	.1	.1	4.2	8.5	.....	1.8	11	.9	.....
30	.1	.1	4.2	8	.....	1.7	1.9	1.4	.....
31	.1	.....	4.2	8	.....	1.6	.....	1.4	.....

NOTE.—Water-stage recorder not in operation Dec. 30 to Jan. 5 and Feb. 25 to Mar. 2; discharge interpolated. No record Oct. 1–21; discharge estimated at 0.1 second-foot. No flow June 8 to Sept. 30.

Monthly discharge of Santa Maria Creek near Ramona, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 57.3 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	.....	.....	0.10	0.0017	0.002	6.1
November	0.1	0.1	.10	.0017	.002	6.0
December	26	.1	2.38	.042	.05	146
January	83	1.6	13.3	.232	.27	818
February	82	2.2	13.4	.234	.24	744
March	12	1.6	5.12	.089	.10	315
April	21	.1	3.59	.063	.07	214
May	2.9	.1	.78	.014	.02	48
June	.9	.0	.05	.00087	.001	3.0
The year	83	.0	3.18	.055	.75	2,300

NOTE.—Mean discharge for October estimated. No flow June 8 to Sept. 30.

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER NEAR MESA GRANDE, CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 9, T. 11 S., R. 2 E., 1 mile below Warner dam site, 1 mile below mouth of Carrizo Creek, and about 5 miles north of Mesa Grande, San Diego County.

DRAINAGE AREA.—209 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 3, 1911, to September 30, 1917.

GAGE.—Friez water-stage recorder on left bank at same site as previous gage; well and gage house were rebuilt during period November 9 to December 12. Staff gage was read November 9 to December 12 and June 2 to September 30. Previous to June 13, 1912, gage was located just above cut-off wall at dam site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable about a mile above gage, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.00 feet at 3 p. m. April 16 (discharge, from extension of rating curve, 1,980 second-feet); minimum stage 1.17 feet at 1.30 p. m. July 17 (discharge, 0.8 second-foot).

1911–1917: Maximum stage recorded, 18.0 feet at 4.30 p. m. January 27, 1916 (discharge, 58,600 second-feet); minimum stage recorded, 0.09 foot August 31, 1914 (discharge, 0.2 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Several fairly well defined rating curves used October 1 to April 17, May 18 to June 1, and June 8 to August 6. Operation of water-stage recorder satisfactory October 1 to November 6 and December 13 to June 1; staff gage read to hundredths, usually once daily for rest of year. Daily discharge for periods covered by rating curves ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph; discharge for rest of year determined by shifting-control method and by interpolation between discharge measurements. Records fair.

Discharge measurements of San Luis Rey River near Mesa Grande, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	E. W. Case	1.12	18	Apr. 3	E. W. Case	1.67	34
14	do	1.14	19	7	do	1.60	30
21	do	1.00	7.3	14	do	1.60	30
28	do	1.01	8.1	17	do	2.37	222
Nov. 4	do	1.07	11	May 1	Angel and Case	1.70	43
11	do	1.18	9.5	5	Phillip Angel	1.70	31
18	do	1.29	11	10	E. A. Bartl	1.71	42
25	do	1.31	14	16	do	1.55	21
Dec. 2	do	1.50	20	19	do	1.79	44
9	do	1.44	15	22	F. C. Ebert	1.55	24
16	do	1.42	13	22	Ebert and Bartl	1.57	24
23	do	1.54	17	26	E. A. Bartl	1.82	49
30	do	1.72	40	June 2	do	1.52	24
Jan. 3	do	3.00	332	8	do	1.44	12
6	do	1.67	39	15	do	1.40	8.5
13	do	2.31	136	23	do	1.24	1.9
22	do	2.00	77	Aug. 4	Bartl and Miller	1.24	2.3
27	do	1.80	50	11	A. R. Miller	1.22	1.9
Feb. 3	do	1.70	37	18	do	1.20	2.0
10	do	1.65	37	24	McClung and Campbell	1.43	1.5
17	do	3.35	410	25	A. R. Miller	1.22	2.4
23	do	4.20	825	31	do	1.22	2.3
24	do	2.66	240	Sept. 8	do	1.18	2.2
Mar. 6	do	1.96	66	15	do	1.20	2.3
18	do	1.80	54	21	do	1.36	12
24	do	1.74	42	29	do	1.20	2.7

Daily discharge, in second-feet, of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.0	8.5	14	36	38	101	45	43	24	1.6	3.4	2.3
2	15	8.5	18	36	36	90	44	40	22	2.2	3.7	2.3
3	30	10	17	220	37	73	36	37	20	1.9	2.8	2.2
4	34	12	18	77	36	70	35	34	18	2.2	2.2	2.2
5	32	17	19	50	36	66	32	31	16	2.8	2.2	2.2
6	30	21	18	41	37	62	32	33	14	3.4	2.8	2.2
7	20	13	16	38	39	52	30	35	12	2.2	2.3	2.2
8	13	11	17	38	41	50	30	37	11	1.0	2.0	2.2
9	10	8	11	38	40	73	33	39	13	.9	2.0	2.2
10	14	8.5	9	37	36	143	49	42	13	.9	2.3	2.2
11	18	9	7	35	37	127	36	38	13	.8	1.9	2.2
12	15	10	13	47	37	101	42	35	14	1.0	2.0	2.3
13	17	9	19	111	37	77	42	32	11	1.6	2.0	2.3
14	19	8	19	50	37	79	35	28	11	1.3	2.0	2.3
15	13	8.5	18	86	31	74	30	24	9	.9	2.0	2.3
16	10	10	14	135	30	68	780	21	8	1.0	2.1	2.3
17	12	12	14	70	251	62	395	21	6	.8	2.0	2.3
18	11	13	13	182	242	55	150	46	5	1.0	2.0	2.3
19	10	13	14	323	180	55	129	44	4.0	.9	2.0	2.3
20	8.5	13	15	140	160	59	117	36	6.5	1.0	1.9	35
21	11	13	15	117	115	50	96	30	3.4	1.3	1.8	16
22	10	13	16	84	506	49	66	24	3.7	1.0	1.7	3.5
23	12	13	17	65	874	48	64	24	3.4	1.0	1.6	3.0
24	11	13	89	50	352	42	56	39	3.2	1.3	1.5	3.5
25	12	13	454	45	340	42	48	58	3.0	5.	2.4	3.5
26	11	14	148	49	195	42	44	46	2.7	1.6	2.4	2.7
27	9.5	14	68	49	136	42	46	33	2.5	1.3	2.4	2.7
28	9.5	13	58	48	110	44	45	29	2.3	4.0	2.3	2.7
29	8.5	13	49	49	.....	44	46	29	2.0	3.7	2.3	2.7
30	8.5	14	40	50	.....	42	45	28	1.8	2.8	2.3	2.7
31	8.5	.....	36	48	.....	44	.....	26	.....	4.0	2.3	.....

NOTE.—No gage-height record June 24–30; discharge interpolated.

103503°—20—WSP 461——3

Monthly discharge of San Luis Rey River near Mesa Grande, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 209 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	34	4.0	14.4	0.069	0.08	885
November	21	8	11.9	.057	.06	708
December	454	7	41.7	.200	.23	2,560
January	323	35	78.8	.377	.43	4,850
February	874	30	144	.689	.72	8,000
March	143	42	65.4	.313	.36	4,020
April	780	30	89.3	.427	.48	5,310
May	58	21	34.3	.164	.19	2,110
June	24	1.8	9.28	.044	.05	552
July	5	.8	1.82	.0087	.01	112
August	3.7	1.5	2.21	.011	.01	136
September	35	2.2	4.03	.019	.02	240
The year	874	.8	40.8	.195	2.64	29,500

SAN LUIS REY RIVER NEAR BONSALL, CALIF.

LOCATION.—In SW. ¼ sec. 31, T. 10 S., R. 3 W., near junction of Escondido highway with Oceanside-Bonsall road, about 2 miles southwest of Bonsall, and 7 miles northeast of Oceanside, San Diego County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 25, 1916, to September 30, 1917 (gage heights and discharge measurements only).

GAGE.—Staff in three sections on left bank 200 feet northwest of junction of highways; read to hundredths once daily by J. E. Clancy. Zero of gage 122.82 feet above sea level. Previous to August 9, 1916, datum was 0.9 foot lower.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from highway bridge at Bonsall.

CHANNEL AND CONTROL.—Shifting sand.

DIVERSIONS.—Water is diverted for irrigation on the Rincon Indian Reservation. The Escondido Mutual Water Co. diverts from San Luis Rey River about 14 miles above Pala. This water, which is stored in the Escondido reservoir (capacity, 3,120 acre-feet) about 6 miles northeast of Escondido, is used for irrigation and municipal supply at Escondido and vicinity. Water is diverted from Pauma Creek for irrigation on Pauma Indian Reservation and Pauma rancho. Morena ditch and Pala Indian Reservation canal divert water in the vicinity of Pala for irrigation. Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

Data inadequate for determination of discharge.

Discharge measurements of San Luis Rey River near Bonsall, Calif., during the period July 25, 1916, to Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
1916.		*Feet.*	*Sec.-ft.*
July 25	Silent and Lee	2.00	5.8
26	.....do	2.00	13
27	.....do	2.00	15
28	.....do	1.99	14
29	.....do	1.97	8.8
30	.....do	1.99	11
31	.....do	2.00	12
Aug. 1	.....do	1.94	7.2
3	.....do	1.94	5.2
4	.....do	1.95	5.7
5	.....do	1.97	8.9
6	.....do	1.98	7.5
7	.....do	1.99	8.3
8	.....do	1.98	5.8
9	.....do	1.07	6.6
10	.....do	1.00	2.4
11	.....do	.....	1.5
12	.....do	1.09	6.8
13	.....do	1.12	8.1
14	.....do	.....	7.9
15	.....do	1.12	8.4
16	.....do	1.11	7.2
17	.....do	1.10	6.2
18	.....do	1.12	9.1
19	R. A. Silent	1.11	8.3
20	Silent and Lee	1.14	9.7
21	R. A. Silent	1.14	10
22	.....do	1.12	8.2
23	.....do	1.15	10
24	Silent and Lee	1.28	22
25	D. L. Lee	1.15	16
26	.....do	1.18	16
27	.....do	1.13	21
28	.....do	1.08	13
29	.....do	1.07	11
30	Silent and Lee	1.05	9.8
31	D. L. Lee	1.04	8.8
Sept. 1	.....do	1.04	7.9
Sept. 2	D. L. Lee	1.03	6.3
3	.....do	1.02	4.3
4	.....do	1.02	4.8
5	.....do	1.05	6.3
6	.....do	1.06	6.5
7	.....do	1.06	6.5
8	.....do	1.05	6.0
9	.....do	1.06	6.6
10	.....do	1.11	8.9
11	.....do	1.13	11
12	.....do	1.06	8.0
13	.....do	1.10	11
14	.....do	1.09	9.8
15	.....do	1.10	12
Oct. 11	W. J. Isbell	1.13	42
Nov. 15	.....do	1.28	31
24	.....do	1.24	42
Dec. 20	F. C. Ebert	1.20	31
1917.			
Jan. 17	.....do	1.25	138
21	D. A. McClung	1.43	297
Feb. 11	.....do	1.16	48
13	F. C. Ebert	1.20	48
23	.....do	1.85	1,610
26	D. A. McClung	1.28	540
Mar. 8	F. C. Ebert	1.19	134
16	.....do	1.41	133
19	D. A. McClung	1.30	88
27	F. C. Ebert	1.26	58
29	.....do	1.23	58
Apr. 11	D. A. McClung	1.30	74
21	McGlashan and Ebert	1.05	83
May 21	F. C. Ebert	.99	65
25	.....do	1.39	129
June 9	D. A. McClung	1.22	31
30	.....do	.99	1.7

NOTE.—Datum of gage raised 0.9 foot, Aug. 9, 1916.

Daily gage height, in feet, of San Luis Rey River near Bonsall, Calif., for the period July 25, 1916, to July 31, 1917.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	1.94	1.04	1.16	1.20	1.12	1.07	1.19	1.10	1.25	1.17	1.34	1.00
2	.....	.....	1.03	1.25	1.21	1.17	1.00	1.11	1.40	1.23	1.11	1.30	.98
3	.....	1.94	1.02	1.30	1.20	1.12	1.25	1.04	1.35	1.22	1.10	1.30	.70
4	.....	1.95	1.02	1.21	1.23	1.19	1.23	1.25	1.25	1.24	1.04	1.25	.70
5	.....	1.97	1.05	1.14	1.34	1.15	1.13	1.16	1.19	1.21	1.02	1.28	.97
6	.....	1.98	1.06	1.30	1.28	1.12	1.00	1.23	1.21	1.23	1.06	1.30	.97
7	.....	1.99	1.06	1.26	1.25	1.15	1.18	1.18	1.23	1.20	1.10	1.28	.97
8	.....	1.98	1.05	1.18	1.25	1.19	1.00	1.19	1.22	1.15	1.11	1.27	.98
9	.....	1.07	1.06	1.18	1.22	1.11	1.00	1.17	1.24	1.37	1.31	1.20	.98
10	.....	1.00	1.11	1.20	1.26	1.00	1.11	1.20	1.43	1.40	1.31	1.22	.97
11	.....	.....	1.13	1.12	1.27	1.24	1.00	1.20	1.42	1.39	1.27	1.25	.98
12	.....	1.09	1.06	1.16	1.23	1.22	1.01	1.18	1.39	1.23	1.30	1.26	.98
13	.....	1.12	1.10	1.13	1.26	1.16	1.03	1.28	1.38	1.28	1.25	1.21	.98
14	.....	.....	1.09	1.20	1.24	1.22	1.23	1.20	1.30	1.30	1.20	1.22	.98
15	.....	1.12	1.10	1.18	1.25	1.18	1.07	1.15	1.40	1.25	1.09	1.15	.98
16	.....	1.11	1.13	1.24	1.22	1.19	1.43	1.20	1.29	1.55	1.10	1.12	.98
17	.....	1.10	1.10	1.23	1.16	1.15	1.30	1.43	1.30	1.80	1.15	1.10	.98
18	.....	1.12	1.14	1.21	1.20	1.10	1.21	1.60	1.33	1.20	1.20	1.15	.98
19	.....	1.11	1.12	1.20	1.23	1.20	1.53	1.50	1.44	1.16	1.27	1.10	1.01
20	.....	1.14	1.14	1.23	1.21	1.15	1.27	1.50	1.40	1.18	1.10	1.05	1.00
21	.....	1.14	1.12	1.20	1.23	1.16	1.50	1.29	1.36	1.10	1.00	1.00	1.00
22	.....	1.12	1.12	1.20	1.29	1.20	1.33	1.55	1.28	1.20	1.06	1.00	1.01
23	.....	1.15	1.10	1.19	1.16	1.23	1.40	2.02	1.39	.86	.98	1.00	1.02
24	.....	1.28	1.14	1.16	1.23	1.19	1.22	1.35	1.33	1.05	1.25	1.00	1.05
25	2.00	1.15	1.14	1.21	1.19	1.58	1.20	1.30	1.35	1.10	1.38	1.00	1.05
26	2.00	1.18	1.12	1.19	1.16	1.00	1.24	1.39	1.30	1.20	1.45	1.00	1.05
27	2.00	1.13	1.10	1.14	1.11	1.07	1.17	1.24	1.39	1.02	1.40	1.00	1.02
28	1.99	1.08	1.13	1.17	1.01	1.04	1.15	1.11	1.40	1.27	1.33	1.00	1.04
29	1.97	1.07	1.11	1.20	1.02	1.10	1.25	.....	1.23	1.03	1.39	1.01	1.02
30	1.99	1.05	1.13	1.21	1.07	1.12	1.20	.....	1.31	1.10	1.41	1.00	1.04
31	2.00	1.04	.....	1.20	.....	1.05	1.27	.....	1.20	.....	1.39	.....	1.00

NOTE.—Stream dry July 29 to Sept. 30, 1917.

ESCONDIDO MUTUAL WATER CO.'S CANAL NEAR NELLIE, CALIF.

LOCATION.—In SW. ¼ NW. ¼ sec. 33, T. 10 S., R. 1 E., 500 feet below intake on San Luis Rey River, 3½ miles above Rincon Indian Reservation, 4 miles southwest of Nellie, San Diego County, and 15 miles northeast of Escondido.

RECORDS AVAILABLE.—October 1, 1896, to September 30, 1917, except that there are no records for the years 1901–2 and 1903–4.

GAGE.—Enameled vertical staff indicating depth of water on crest of weir.

DISCHARGE MEASUREMENTS.—Made from plank across canal or by wading at various sections near gage.

CONTROL.—Rectangular weir with 6-foot crest length, 500 feet below intake. October 29, 1915, wooden weir board was replaced by concrete slab with steel plate for crest. Length of crest not changed. March, 1916, Mr. E. R. Bowen installed a weir at south portal of tunnel No. 2 and developed rating curves for the various crude weirs which had been used in previous years

COOPERATION.—Gage-height record and rating table furnished by Escondido Mutual Water Co.

The canal, which is 5.6 miles long, consists of flume, ditch, and tunnel sections constructed through a very rough, mountainous country. It discharges into a reservoir about 6 miles northeast of Escondido. The dam, which is 76 feet high and 380 feet long, is of the usual rock-fill type, with a facing of redwood planks. The reservoir (capacity, 3,120 acre-feet) supplies water for irrigation and domestic uses at Escondido and vicinity.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Calif., for the year ending Sept. 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	14	24	24	4.8	8.9	16	9.8	5.9	6.3	3.5
2	.....	17	24	23	4.8	8.9	22	9.8	6.3	5.9	3.5
3	.....	22	.....	24	4.8	8.9	22	19	6.3	4.8	3.5
4	.....	20	9.8	24	4.8	8.9	22	18	5.9	5.1	3.5
5	.....	18	22	23	4.8	8.9	22	18	5.9	4.8	3.5
6	.....	18	22	24	4.8	8.9	22	17	5.9	4.8	3.2
7	.....	16	22	26	6.3	8.9	22	15	5.9	4.8	3.2
8	.....	12	22	24	6.3	8.9	9.8	13	5.5	4.5	3.0
9	.....	9.8	21	26	6.3	8.4	9.8	11	5.5	4.2	1.9
10	.....	15	21	26	6.3	8.9	8.9	11	5.1	4.2	.....
11	.....	15	22	26	6.3	8.9	8.9	11	5.1	4.2	3.0
12	.....	15	22	26	6.3	8.9	8.9	9.8	5.1	4.2	3.0
13	.....	14	22	26	6.3	8.9	8.9	9.8	5.5	4.2	3.0
14	.....	11	22	26	6.3	8.9	8.9	8.9	5.5	4.2	3.0
15	.....	11	22	26	6.3	8.9	8.9	8.9	5.1	4.2	3.0
16	.....	11	22	23	6.3	5.1	8.9	8.9	5.1	4.2	3.0
17	.....	13	22	26	6.3	8.9	8.9	8.9	4.8	3.8	3.2
18	.....	14	21	14	6.3	8.9	8.9	6.7	5.1	4.2	3.2
19	.....	18	16	14	6.3	9.8	8.9	6.3	4.8	3.8	2.7
20	.....	19	.....	14	9.8	9.8	8.9	6.3	4.8	3.8	4.8
21	.....	10	.....	14	14	9.8	8.9	.....	3.5	4.2	16
22	.....	.....	.....	14	14	9.8	8.9	.....	4.8	3.8	6.3
23	.....	.....	.....	14	16	9.8	8.9	.....	4.8	3.8	4.8
24	.....	.....	.....	23	16	9.8	8.9	.....	5.5	4.2	4.8
25	.....	.....	.....	23	16	9.8	8.9	.....	5.9	3.8	5.5
26	.....	.....	16	14	16	13	8.9	6.3	5.5	3.8	5.1
27	13	.....	21	11	16	9.8	8.9	8.0	5.5	3.8	4.5
28	12	.....	21	11	16	9.8	8.9	8.0	7.1	3.5	4.2
29	14	.....	22	.....	18	15	8.9	6.3	5.9	3.5	4.2
30	15	.....	22	.....	18	15	8.9	6.3	5.5	3.5	3.8
31	.....	18	24	.....	8.9	.....	8.9	.....	5.9	3.5	.....

NOTE.—No flow Oct. 1 to Nov. 26, Dec. 22–30, Jan. 3, 20–25, June 21–25, and Sept. 10.

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0	0	0	0
November	15	0	1.80	107
December	22	0	10.7	658
January	24	0	16.3	1,000
February	26	11	21.0	1,170
March	18	4.8	9.34	574
April	15	5.1	9.57	569
May	22	8.9	11.7	719
June	19	0	8.73	519
July	7.1	3.5	5.45	335
August	6.3	3.5	4.25	261
September	16	0	4.00	238
The period	26	0	7.49	6,150

SANTA ANA RIVER BASIN.

SANTA ANA RIVER NEAR MENTONE, CALIF.

LOCATION.—In SW. ¼ sec. 4, T. 1 S., R. 2 W., near mouth of canyon, one-fourth mile above Southern California Edison Co.'s Mentone plant, half a mile above mouth of Deep Creek, and 3½ miles northeast of Mentone, San Bernardino County.

DRAINAGE AREA.—189 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1, 1896, to September 30, 1917.

GAGE.—Vertical staff fastened to a rock ledge on left bank one-fourth mile above power house. The gage was installed February 11, 1916, original datum not maintained. Record September 7–30, 1917, is from Gurley graph water-stage recorder at same location and datum. Gage used before February 11, 1916, was a vertical staff 10 feet upstream; destroyed by flood in January, 1916. Original gage was just above Warm Springs Canyon, 1½ miles upstream. Gage read by E. Givens.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders, shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet at 8 a. m. February 25 (discharge, 164 second-feet); minimum stage, 0.28 foot at 8 a. m. November 11 (discharge, 1.1 second-feet).

1896–1917: Maximum discharge (stage not known, gage washed out) January 27, 1916, 29,100 second-feet; minimum discharge, 0.6 second-foot during parts of every month from October, 1913, to January, 1914 (stage, 2.3 feet).

DIVERSIONS.—Water is diverted at Southern California Edison Co.'s plant No. 2, 2½ miles above the gage for use at Mentone power house. The Greenspot pipe line diverts water for irrigation from the forebay at the Mentone power house. From the tailrace the water is carried across Santa Ana River and used for irrigation.

REGULATION.—Water is stored on Bear Creek at Bear Valley reservoir. Southern California Edison Co.'s power plants Nos. 1 and 2 are 5¼ and 2¾ miles, respectively, above the Mentone plant.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read once a day to hundredths. Daily discharge October 1 to September 3 ascertained by applying gage height to rating table; September 7–30, by applying to the rating table mean daily gage height determined by inspecting gage-height graph. Records October 1 to September 6, fair; remainder of record good.

Discharge measurements of Santa Ana River near Mentone, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 15	F. C. Ebert	0.55	3.7	Mar. 26	F. C. Ebert	0.82	9.9
Jan. 16	do	.65	6.0	Apr. 25	Ebert and Dort	1.24	35
Feb. 12	do	.61	4.8	May 18	F. C. Ebert	1.19	29
24	do	1.35	49	Sept. 7	do	.72	8.5
Mar. 6	do	.71	7.7				

Daily discharge, in second-feet, of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	21	18	3.4	4.2	5	25	26	70	4.5	5	4.2	12
2	28	18	3.4	4.2	5	23	19	67	3.9	5	11	12
3	31	18	3.4	9	5	15	18	64	3.9	3.9	9	9
4	26	18	3.4	6.5	5	12	18	68	3.9	8	13	9
5	18	16	3.4	6.5	5	9	18	73	3.6	4.2	11	8.5
6	28	6.5	3.4	5.5	5	8	18	73	3.6	4.2	10	8
7	21	6	3.6	5	4.5	6.5	18	69	3.0	4.2	12	8
8	19	6	3.6	4.5	4.5	6.5	67	72	3.0	5	14	7.5
9	19	4.2	3.6	4.5	4.5	7	26	60	3.0	5	14	6
10	14	2.3	3.6	4.8	4.5	14	31	58	3.0	4.5	17	6
11	8.5	1.1	3.4	4.8	4.5	14	26	52	3.0	5	19	5.5
12	7	3.9	3.4	4.5	4.8	13	24	49	2.9	5	39	3.0
13	7.5	3.9	3.4	5	4.8	10	24	49	2.8	5	29	4.4
14	7.5	3.9	3.4	4.5	5.5	9.5	24	45	3.3	5.5	19	5.5
15	19	3.8	3.4	6	5.5	8.5	31	43	3.3	6	17	8
16	31	3.8	3.4	6	6	7.5	35	43	3.3	5.5	15	7
17	29	3.8	3.4	6	8	6.5	32	41	18	5	12	8
18	29	3.8	3.4	6.5	8	6	29	34	4.2	4.5	9.5	6
19	28	3.8	3.4	62	8	7	25	31	3.9	3.6	5	6
20	24	3.8	3.4	17	8	9.5	25	34	3.6	3.3	3.9	5.5
21	21	3.6	3.4	13	9.5	10	26	24	3.6	3.3	4.5	6
22	18	3.6	3.4	11	113	10	27	15	4.2	3.3	4.2	5.5
23	17	3.6	3.4	8	88	10	29	14	6	3.3	6	7.5
24	17	3.6	3.4	7	51	9	32	14	7.5	5	15	8.5
25	18	3.6	20	6.5	164	7.5	37	18	7	6.5	16	7.5
26	18	3.6	11	6.5	91	12	43	15	6.5	6	12	6
27	18	3.6	6	6	58	16	43	9	5.5	5.5	12	4.5
28	15	3.6	5	6	32	25	64	6.5	5	14	10	5
29	13	3.6	5	6	.....	32	72	5.5	5	11	9.5	4.8
30	18	3.4	5	8	.....	39	73	5.5	5	7.5	9	3.6
31	18	.....	4.8	5.5	.....	34	.....	4.5	.....	5	9	.....

NOTE.—No gage-height record Sept. 4–6; discharge interpolated.

Monthly discharge of Santa Ana River near Mentone, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	31	7	19.6	1,210
November	18	1.1	6.15	366
December	20	3.4	4.49	276
January	62	4.2	8.40	516
February	164	4.5	25.6	1,420
March	39	6	13.6	836
April	73	18	32.7	1,950
May	73	4.5	39.5	2,430
June	18	2.8	4.63	276
July	14	3.3	5.41	333
August	39	3.9	12.6	775
September	12	3.0	6.79	404
The year	164	1.1	14.9	10,800

Combined daily discharge, in second-feet, of Santa Ana River and canals near Mentone, Calif., for year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	114	112	79	85	67	114	118	164	87	92	98	106
2	122	106	79	85	67	112	110	160	86	92	105	106
3	124	106	79	90	67	104	110	158	86	91	103	103
4	114	106	79	88	67	102	110	162	86	90	107	103
5	106	104	79	82	78	98	110	166	86	87	105	102
6	122	94	79	82	78	98	110	166	86	87	104	102
7	111	94	79	81	78	96	110	162	82	92	106	102
8	109	94	79	80	68	96	69	166	82	92	108	102
9	110	92	79	80	73	96	111	154	82	92	108	100
10	104	90	79	81	73	104	118	152	82	92	111	100
11	99	89	79	83	73	104	114	146	86	92	113	100
12	98	92	79	83	73	102	112	142	81	92	133	97
13	98	92	79	84	73	100	112	142	81	92	123	98
14	94	92	79	83	74	99	112	138	82	93	113	100
15	105	86	79	83	74	98	118	136	91	94	111	102
16	117	82	79	83	74	97	122	136	91	93	109	101
17	115	86	79	73	72	96	126	134	18	92	106	102
18	115	82	79	84	73	96	122	128	72	92	104	100
19	114	82	79	144	82	96	118	124	86	91	93	100
20	110	82	79	99	86	99	118	128	86	91	92	100
21	107	82	79	95	93	100	120	112	91	91	92	100
22	104	82	79	93	202	100	120	102	92	91	92	100
23	103	82	79	85	178	100	122	102	94	91	94	102
24	103	82	79	84	140	98	126	102	95	92	109	102
25	104	82	100	84	254	97	130	106	94	94	110	102
26	108	82	86	84	180	102	136	102	94	94	106	100
27	111	79	86	83	148	106	136	96	93	93	106	98
28	106	79	81	73	122	114	158	100	92	102	104	99
29	104	79	86	73	.....	122	166	99	92	98	104	99
30	109	79	86	90	.....	130	166	93	88	96	103	98
31	112	.....	86	72	.....	126	.....	92	.....	93	103	.....

NOTE.—Water turned out of Southern California Edison Co.'s canal Apr. 8 and June 17; Greenspot pipe line on June 17. Discharge given above table for these days as well as for other days when discharge of canals was changed, may be subject to considerable error as the discharge given for river alone may not be the correct mean for the day. See pp. 40 and 41 for daily discharge of Southern California Edison Co.'s canal and Greenspot pipe line.

Combined monthly discharge of Santa Ana River and canals near Mentone, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 189 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	124	94	109	0.577	0.67	6,700
November	112	79	89.0	.471	.53	5,300
December	100	79	80.9	.428	.49	4,970
January	144	72	85.5	.452	.52	5,260
February	254	67	99.5	.526	.55	5,530
March	130	96	103	.545	.63	6,330
April	166	69	121	.640	.71	7,200
May	166	92	131	.693	.80	8,050
June	95	18	84.8	.449	.50	5,050
July	102	87	92.4	.489	.56	5,680
August	133	92	106	.561	.65	6,520
September	106	97	101	.534	.60	6,010
The year	254	18	100	0.529	7.21	72,600

NOTE.—For monthly discharge tables for Southern California Edison Co.'s canal and Greenspot pipe line, see p. 41.

SOUTHERN CALIFORNIA EDISON CO.'S CANAL AND GREENSPOT PIPE LINE NEAR MENTONE, CALIF.

LOCATION.—At Southern California Edison Co.'s plant at mouth of canyon, 2¾ miles below intake on Santa Ana River, and about 3 miles northeast of Mentone, San Bernardino County.

RECORDS AVAILABLE.—1896 to September 30, 1917.

DISCHARGE.—Computed from records showing kilowatt output of power plant, on the assumption that 1 second-foot develops 18.9 kilowatts.

EXTREMES OF DISCHARGE.—1896–1917: Maximum mean daily discharge recorded, 97 second-feet March 16, 1905; no flow during periods nearly every year.

DIVERSIONS.—Water diverted from the fore bay by the Greenspot pipe line must be added to give total flow of canal. From 1903 to 1911 pipe line diverted water from canal above forebay and no discharge was reported. The present pipe line was put in operation September 7, 1911.

The intake of this canal is at Southern California Edison Co.'s power plant No. 2, 2¾ miles above the Mentone plant at the mouth of the canyon. All water except that taken by the Greenspot pipe line is first used for development of power; after it leaves the Mentone power house, it is conducted across Santa Ana River in a flume and discharged into a lined canal from which it is distributed for irrigation. Before it enters the irrigation canal it passes through three power plants.

Daily discharge, in second-feet, of Southern California Edison Co.'s canal near Mentone, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	85	85	70	79	59	85	85	85	74	79	85	85
2	85	79	70	79	59	85	85	85	74	79	85	85
3	85	79	70	79	59	85	85	85	74	79	85	85
4	79	79	70	79	59	85	85	85	74	74	85	85
5	79	79	70	74	70	85	85	85	74	74	85	85
6	85	79	70	74	70	85	85	85	74	74	85	85
7	85	79	70	74	70	85	85	85	70	79	85	85
8	85	79	70	74	59	85	0	85	70	79	85	85
9	85	79	70	74	64	85	79	85	70	79	85	85
10	85	79	70	74	64	85	79	85	70	79	85	85
11	85	79	70	74	64	85	79	85	74	79	85	85
12	85	79	70	74	64	85	79	85	70	79	85	85
13	85	79	70	74	64	85	79	85	70	79	85	85
14	85	79	70	74	64	85	79	85	70	79	85	85
15	85	74	70	74	64	85	79	85	79	79	85	85
16	85	70	70	74	64	85	79	85	79	79	85	85
17	85	74	70	64	59	85	85	85	0	79	85	85
18	85	70	70	74	59	85	85	85	59	79	85	85
19	85	70	70	79	70	85	85	85	74	79	79	85
20	85	70	70	79	74	85	85	85	74	79	79	85
21	85	70	70	79	79	85	85	79	79	79	79	85
22	85	70	70	79	85	85	85	79	79	79	79	85
23	85	70	70	74	85	85	85	79	79	79	79	85
24	85	70	70	74	85	85	85	79	79	79	85	85
25	85	70	74	74	85	85	85	79	79	79	85	85
26	85	70	70	74	85	85	85	79	79	79	85	85
27	85	70	74	74	85	85	85	79	79	79	85	85
28	85	70	74	64	85	85	85	85	79	79	85	85
29	85	70	79	64	.....	85	85	85	79	79	85	85
30	85	70	79	79	.....	85	85	79	74	79	85	85
31	85	.....	79	64	.....	85	.....	79	.....	79	85	.....

Monthly discharge of Southern California Edison Co.'s canal near Mentone, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	85	79	84.6	5,200
November	85	70	74.7	4,440
December	79	70	71.3	4,380
January	79	64	74.2	4,560
February	85	59	69.8	3,880
March	85	85	85.0	5,230
April	85	0	80.6	4,800
May	85	79	83.3	5,120
June	79	0	71.9	4,280
July	79	74	78.5	4,830
August	85	79	84.0	5,160
September	85	85	85.0	5,060
The year	85	0	78.6	56,900

Daily discharge, in second-feet, of Greenspot pipe line near Mentone, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
2	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
3	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
4	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
5	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
6	8.5	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
7	5.0	8.7	5.5	2.0	3.0	4.5	6.5	8.5	8.5	8.5	9.0	9.0
8	5.0	8.7	5.5	2.0	4.5	4.5	2.1	8.5	8.5	8.5	9.0	9.0
9	5.5	8.7	5.5	2.0	4.5	4.5	5.7	8.5	8.5	8.5	9.0	9.0
10	5.5	8.7	5.5	2.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
11	5.5	8.7	5.5	4.5	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
12	5.5	8.7	5.5	4.5	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
13	5.5	8.7	5.5	4.5	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
14	1.3	8.7	5.5	4.5	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
15	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
16	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
17	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	.0	8.5	9.0	9.0
18	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
19	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
20	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
21	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
22	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
23	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
24	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
25	1.3	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
26	5.1	8.7	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
27	8.0	5.5	5.5	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
28	6.0	5.5	2.0	3.0	4.5	4.5	8.5	8.5	8.5	8.5	9.0	9.0
29	6.0	5.5	2.0	3.0	.....	4.5	8.5	8.5	8.5	8.5	9.0	9.0
30	6.0	5.5	2.0	3.0	.....	6.5	8.5	8.5	8.5	9.0	9.0	9.0
31	8.7	.....	2.0	3.0	.....	6.5	.....	8.5	.....	9.0	9.0	.....

Monthly discharge of Greenspot pipe line near Mentone, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	8.7	1.3	4.64	285
November	8.7	5.5	8.27	492
December	5.5	2.0	5.05	311
January	4.5	2.0	2.87	176
February	4.5	3.0	4.12	229
March	6.5	4.5	4.63	285
April	8.5	2.1	7.73	460
May	8.5	8.5	8.50	523
June	8.5	.0	8.22	489
July	9.0	8.5	8.53	524
August	9.0	9.0	9.00	553
September	9.0	9.0	9.00	536
The year	9.0	.0	6.72	4,860

MILL CREEK AT FOREST HOME,[1] CALIF.

LOCATION.—In NW. ¼ NE. ¼ sec. 13, T. 1 S., R. 1 W., at Forest Home, San Bernardino County, about 2½ miles below Falls Creek, 4 miles above Mountain Home Creek, and 14 miles east of Redlands.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 23, 1903, to September 30, 1917.

DISCHARGE.—Obtained by combining results of current-meter measurements in power canal with flow over diverting dam. The flow over diverting dam is only roughly determined.

EXTREMES OF DISCHARGE.—1903–1917: Maximum mean daily discharge reported, 368 second-feet February 20, 1914 (no record for flood of January, 1916); minimum mean daily discharge reported, 7.0 second-feet November 19 and 20, 1904.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Two sets of observations recorded each day at 6 a. m. and 6 p. m. When total flow of Mill Creek is diverted into power canal records are considered good; for higher stages they are roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

Daily discharge, in second-feet, of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	19	16	14	14	15	22	30	28	22	20	15
2	47	19	16	14	14	15	22	34	28	22	20	15
3	25	19	16	14	14	15	23	30	27	21	24	15
4	24	19	16	14	15	16	23	30	28	21	20	14
5	24	19	16	14	15	16	23	29	27	21	18	14
6	26	19	16	14	15	16	23	29	27	21	18	14
7	25	19	16	14	15	16	23	29	28	21	18	14
8	24	19	16	14	15	16	23	30	28	20	18	14
9	24	18	15	14	15	16	22	30	27	20	18	14
10	24	18	15	14	15	16	22	29	27	20	18	14
11	22	18	14	14	15	16	22	29	27	19	19	14
12	24	18	14	14	15	16	23	29	27	19	18	14
13	23	18	14	14	15	17	22	29	27	19	19	14
14	23	18	14	14	15	17	22	29	26	19	18	14
15	23	17	14	14	15	16	22	29	26	18	18	14
16	22	17	14	14	15	16	22	29	26	17	17	13
17	23	17	14	14	15	16	23	29	26	17	17	13
18	22	17	14	14	15	15	27	29	25	17	17	13
19	22	17	14	16	15	17	28	29	25	17	17	13
20	21	17	14	15	15	18	28	29	25	16	17	14
21	20	17	14	14	15	23	29	29	25	17	17	13
22	20	17	14	14	18	23	29	29	25	19	17	13
23	20	17	14	14	17	21	29	29	24	18	17	13
24	19	17	14	14	15	22	29	29	24	18	16	13
25	20	16	14	14	29	26	30	28	23	17	16	13
26	20	16	15	14	18	27	30	28	24	29	16	13
27	19	16	15	14	16	26	30	28	23	112	16	13
28	19	16	14	14	15	25	30	28	23	26	16	13
29	19	16	14	14	.....	25	30	28	24	22	16	13
30	19	16	14	15	.....	25	30	28	23	22	15	13
31	19	.....	14	14	.....	24	.....	28	.....	21	15	.....

[1] Akers Camp on map of San Gorgonio quadrangle, U. S. Geol. Survey.

Monthly discharge of Mill Creek at Forest Home, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	47	19	22.8	1,400
November	19	16	17.5	1,040
December	16	14	14.6	898
January	16	14	14.1	867
February	29	14	15.7	872
March	27	15	19.0	1,170
April	30	22	25.4	1,510
May	34	28	29.1	1,790
June	28	23	25.8	1,540
July	112	16	22.8	1,400
August	24	15	17.6	1,080
September	15	13	13.6	809
The year	112	13	19.9	14,400

LYTLE CREEK NEAR SAN BERNARDINO, CALIF.

LOCATION.—In NW. ¼ sec. 25, T. 2 N., R. 6 W., at Southern California Edison Co.'s diversion dam, below junction of North and Middle forks of Lytle Creek, in Angeles National Forest, about 3 miles above mouth of canyon and 14 miles northwest of San Bernardino, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1904, to September 30, 1917.

GAGE.—Watson water-stage recorder in pool above weir in power canal.

DISCHARGE.—Computed by combining flow in power canal with flow over diverting dam; discharge of power canal is measured near intake by an 8-foot steel plate rectangular weir; flow over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1904–1917: Maximum mean daily discharge reported, 4,750 second-feet January 18, 1916; minimum mean daily discharge reported, 5.1 second-feet September 30 and October 3, 1904.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Daily discharge is mean of two observations recorded each day at 6 a. m. and 6 p. m. When total flow of Lytle Creek is diverted into power canal, records are good; above 23 second-feet (capacity of canal) they are roughly approximate.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. W. Dennis, construction engineer.

Daily discharge, in second-feet, of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	38	40	30	40	36	50	32	32	29	22	20	21
2	45	40	30	40	36	50	32	32	28	21	20	21
3	75	40	30	40	34	50	32	32	28	21	20	22
4	65	40	30	40	32	45	32	32	28	21	19	22
5	60	40	30	40	32	40	32	32	28	21	20	22
6	95	40	30	40	31	40	32	32	28	20	20	22
7	65	40	30	40	30	40	32	32	28	20	20	22
8	60	37	30	40	30	38	32	32	28	21	20	22
9	60	34	30	40	30	38	32	28	28	20	20	22
10	60	34	30	40	30	38	32	30	28	20	20	22
11	55	34	30	40	30	40	32	30	28	20	21	22
12	50	34	30	40	30	40	32	30	27	20	21	22
13	50	34	30	36	30	36	32	30	25	20	21	22
14	50	32	30	32	30	36	32	30	24	20	20	22
15	50	32	30	32	30	36	32	30	23	20	20	22
16	50	30	30	40	30	36	36	30	22	20	20	22
17	50	30	30	40	36	36	36	30	22	19	20	22
18	50	30	30	40	41	34	34	30	22	19	19	22
19	50	30	30	45	40	32	32	30	22	18	20	22
20	45	30	30	40	50	32	32	30	21	18	20	22
21	40	30	30	40	55	32	32	30	22	18	20	22
22	40	30	30	40	60	32	32	30	22	18	20	22
23	40	30	32	40	70	32	32	30	22	17	20	22
24	40	30	230	40	55	32	32	30	22	18	20	22
25	40	30	80	40	130	32	32	30	21	17	20	22
26	40	30	55	40	65	30	32	30	22	18	20	22
27	40	30	50	40	55	30	32	30	21	18	20	22
28	40	30	50	38	50	30	32	30	21	18	19	22
29	40	30	50	36	.....	30	33	30	22	20	20	22
30	40	30	40	36	.....	30	32	30	22	20	19	22
31	40	.....	40	36	.....	30	.....	30	.....	20	22	.....

Monthly discharge of Lytle Creek near San Bernardino, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	95	38	56.4	3,100
November	40	30	33.4	1,990
December	230	30	41.5	2,550
January	45	32	39.1	2,400
February	130	30	43.1	2,390
March	50	30	36.4	2,240
April	36	32	32.4	1,930
May	32	28	30.5	1,880
June	29	21	24.5	1,460
July	22	17	19.5	1,200
August	22	19	20.0	1,230
September	22	21	21.9	1,300
The year	230	17	32.7	23,700

SAN JACINTO RIVER NEAR ELSINORE, CALIF.

LOCATION.—Near east line sec. 9, T. 6 S., R. 4 W., about 2¼ miles above junction with Elsinore Lake (low-water stage), one-fourth mile above highway crossing, and 2 miles southeast of Elsinore, Riverside County.

DRAINAGE AREA.—717 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1916, to September 30, 1917.

GAGE.—Vertical staff in two sections on right bank about one-fourth mile above highway crossing; read by W. L. Wilhite.

DISCHARGE MEASUREMENTS.—Made from railway bridge three-fourths mile below gage or by wading below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; apparently permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.52 feet at 4 p. m. February 26 (discharge, 130 second-feet); channel dry for several months during year.

1916–1917: Maximum stage recorded, 19.0 feet at 11 a. m. January 28, 1916 (discharge, 14,000 second-feet); channel dry for several months each year.

DIVERSIONS.—The Temescal Water Co. diverts water for irrigation above the station. Water is also diverted above San Jacinto for irrigation.

REGULATION.—Water is stored for irrigation at Hemet reservoir on South Fork of San Jacinto River.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined throughout. Gage read to hundredths during low and medium stages once daily. Records only fair on account of incomplete gage-height record.

Discharge measurements of San Jacinto River near Elsinore, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 17	F. C. Ebert	1.19	1.3	Mar. 16	F. C. Ebert	2.02	47
Feb. 13	do	1.16	.9	27	do	1.33	4.7
24	do	1.68	19	Apr. 21	McGlashan and Ebert	1.27	2.7
Mar. 7	do	2.33	95	May 20	F. C. Ebert	1.09	.4

Daily discharge, in second-feet, of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	1.6	2.1	94	40	35	1.4	0.4	a0.3
2	2.1	2.1	84	58	21	a1.3	a.2	a.2
3	2.1	1.6	80	63	a12	1.2	.0	.1
4	a2.2	a1.5	a82	27	2.6	.9	a.0	.....
5	a2.2	1.4	84	25	a2.0	a1.0	.0	.....
6	2.3	1.4	84	10	1.4	1.2	.0	.....
7	a2.2	1.4	94	8	16	a1.0	.0	.....
8	2.1	1.4	66	a7.5	3.0	.7	a.0	.....
9	a1.8	1.4	58	7	a2.2	a.6	.0	.....
10	1.6	1.4	a58	3.0	1.4	.4	.0	.....
11	1.6	1.4	58	2.6	a1.4	.5	a.0	.....
12	2.6	1.4	58	1.6	1.4	.4	a.0	.....
13	2.1	1.4	58	1.6	a1.1	a.3	a.0	.....
14	a2.4	1.2	58	6.5	a.8	a.3	a.0	.....
15	2.6	1.4	a56	a12	.5	.2	a.0	.....
16	a2.0	1.2	53	17	.5	a.1	a.0	.....
17	1.5	a2.9	a49	16	a.4	.0	a.0	.....
18	2.6	4.6	a45	6	.4	a.0	a.0	.....
19	15	6.5	42	10	.4	.0	a.0	.....
20	10	11	40	3.5	.5	a.0	a.0	.....
21	a15	11	38	6.5	.5	.0	a.0	.....
22	20	11	36	4.6	.5	.4	a.0	.....
23	15	15	35	a7	.5	a.4	a.0	.....
24	10	30	33	9.5	a.6	.4	a.0	.....
25	6.5	a74	a19	9.5	a.6	a.4	a.0	.....
26	4.6	119	5	a8	.7	.3	a.0	.....
27	3.5	126	4.6	7	.2	.2	a.0	.....
28	a3.5	a110	4.0	8	.2	a.4	6	.....
29	3.5	.....	5	a20	.9	.7	a3.4	.....
30	2.6	.....	2.6	32	a1.2	a.6	.7	.....
31	2.1	.....	a20	.....	1.6	.....	.4	.....

a Gage not read; discharge interpolated.

NOTE.—No flow Oct. 1 to Dec. 31 and Aug. 4 to Sept. 30.

Monthly discharge of San Jacinto River near Elsinore, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0.0
November	.0	.0	.0	.0
December	.0	.0	.0	.0
January	20	1.5	4.80	295
February	126	1.2	19.5	1,080
March	94	2.6	48.5	2,980
April	63	1.6	14.6	869
May	35	.2	3.60	221
June	1.4	.0	.510	30.3
July	6	.0	.358	22
August	.3	.0	.019	1.2
September	.0	.0	.000	.0
The year	126	.0	7.60	5,500

ELSINORE LAKE AT ELSINORE, CALIF.

LOCATION.—A short distance southeast of outlet, at Elsinore, Riverside County.

RECORDS AVAILABLE.—December 1, 1915, to September 30, 1917.

GAGE.—Vertical staff in several sections on northeast shore a short distance above outlet. Add 1,200 feet to published elevations to convert to mean sea level. Gage read by W. L. Wilhite.

Daily elevation, in feet, of Elsinore Lake at Elsinore, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	60.6	.....	.....	60.2	60.4	.....	.....	.....	.....	.....	59.6
2	.....	60.4	60.0	.....	.....	.....	.....	60.5	60.0	59.7	.....
3	.....	.....	.....	.....	.....	60.6	60.7	.....	60.0	.....	.....
4	.....	60.4	60.0	.....	.....	.....	.....	60.5	.....	.....	59.6
5	.....	.....	.....	.....	.....	60.6	.....	.....	.....	59.7	.....
6	60.6	.....	.....	60.2	60.4	.....	60.6	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	60.7	.....	.....	.....	59.6	.....
8	.....	60.4	.....	60.2	.....	60.8	.....	60.4	59.8	.....	59.6
9	.....	.....	60.0	.....	.....	.....	60.6	.....	.....	59.6	.....
10	60.6	.....	.....	.....	60.3	.....	.....	60.4	.....	.....	.....
11	.....	60.2	.....	.....	.....	.....	.....	.....	.....	.....	59.6
12	.....	.....	60.0	60.2	.....	60.8	60.6	60.4	59.8	.....	.....
13	60.6	.....	.....	.....	.....	.....	60.7	.....	.....	.....	.....
14	.....	.....	.....	.....	60.3	60.8	.....	60.4	59.8	.....	59.6
15	.....	60.2	60.0	60.2	.....	.....	.....	.....	.....	59.6	.....
16	.....	.....	.....	.....	60.3	60.8	.....	.....	59.8	.....	.....
17	60.7	.....	.....	.....	.....	.....	60 7	.....	.....	59.6	.....
18	.....	60.2	60.0	.....	60.4	.....	.....	.....	59.8	.....	.....
19	.....	.....	.....	60.4	.....	.....	.....	60.3	.....	.....	.....
20	60.6	.....	.....	60.4	60.4	60.8	60.6	.....	.....	.....	.....
21	.....	60.2	.....	.....	.....	.....	.....	.....	59.8	59.6	.....
22	.....	.....	60.0	.....	.....	60.8	60.6	60.2	.....	.....	.....
23	.....	.....	.....	.....	60.5	.....	.....	.....	.....	59.6	.....
24	.....	60.0	.....	60.4	.....	60.8	.....	60.0	.....	.....	.....
25	60.4	.....	60.0	.....	.....	60.8	60.6	.....	.....	.....	.....
26	60.4	.....	.....	.....	60.6	.....	.....	60.2	.....	.....	.....
27	.....	60.0	.....	60.4	.....	60.8	60.6	60.2	59.7	.....	.....
28	60.4	.....	.....	.....	.....	.....	.....	.....	.....	59.6	.....
29	.....	.....	60.2	60.4	.....	.....	.....	60.0	59.7	.....	.....
30	.....	.....	.....	.....	.....	.....	60.6	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	60.8	.....	60.0	.....	.....	.....

TEMESCAL CREEK NEAR ELSINORE, CALIF.

LOCATION.—In Laguna grant, at private bridge about 1¼ miles northwest of Elsinore, Riverside County, and 2 miles below outlet of Elsinore Lake.

DRAINAGE AREA.—Not measured. Elsinore Lake overflows only during years of heavy rainfall.

RECORDS AVAILABLE.—April 10, 1916, to September 30, 1917.

GAGE.—Vertical staff fastened to left bridge abutment near downstream end; read by W. L. Wilhite.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand; banks are high and not subject to overflow. About January 20 the channel at outlet of lake was deepened, permitting more water to leave Elsinore Lake. March 8 to June 30 weeds and moss were growing in channel.

DIVERSIONS.—Hemet Water Co. diverts water from San Jacinto River above San Jacinto, and Temescal Water Co.'s canal has intake in Railroad Canyon above Elsinore Lake. Considerable water is pumped from wells in Perris Valley.

REGULATION.—Water is stored in Hemet reservoir on South Fork of San Jacinto River.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used October 1 to March 7 well defined. Gage read to hundredths once daily. Daily discharge October 1 to March 7, ascertained by applying gage height to rating table; for remainder of year computed by shifting-control method owing to growth of weeds and moss in channel. Records fair.

Discharge measurements of Temescal Creek near Elsinore, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 7	F. C. Ebert	0.79	2.4	Mar. 16	F. C. Ebert	1.43	13
Jan. 17	do	.50	.2	26	do	1.51	13
Feb. 13	do	1.04	6.0	Apr. 21	McGlashan and Ebert	1.56	9.1
Mar. 7	do	1.30	11	May 20	F. C. Ebert	1.28	3.5

Daily discharge, in second-feet, of Temescal Creek near Elsinore, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	a 0.4	3.1	2.8	0.3	6.5	10	a 12	8.5	0.8
2	.4	3.1	2.8	.3	6.5	a 10	11	a 8	a .9
3	.4	4.0	a 3.0	.3	a 6.5	10	11	8	a 1.1
4	.4	4.0	3.1	.3	a 6.5	9.5	11	a 8	1.2
5	.4	a 4.2	3.1	.2	6.5	a 10	11	8	.8
6	.4	4.3	3.1	.2	6.5	11	a 11	a 8	.5
7	a .4	4.3	2.3	a .2	6.5	11	11	8	a .4
8	a .4	3.4	2.3	.2	6	12	a 11	8	.2
9	.4	3.4	2.3	.2	6	a 12	11	7	a .2
10	.4	a 3.2	a 2.2	.2	6	13	11	7	a .2
11	a .4	3.1	2.1	.2	a 6	13	11	a 7	.2
12	.4	a 3.2	2.1	.2	a 6	13	11	6.5	.3
13	.5	a 3.3	2.1	.3	6	12	11	6.5	a .3
14	.5	3.4	2.1	a .3	6	12	a 10	a 6	.3
15	a .5	4.0	2.1	.3	6	12	a 10	6	.3
16	.5	4.0	2.1	.3	a 7	13	10	5.5	.4
17	.5	4.0	a 2.0	.2	7.5	13	10	5	a .4
18	.5	4.0	1.8	.3	7.5	a 14	10	a 5	a .3
19	.7	4.4	1.8	a 3.4	a 7.5	14	9	5	.3
20	.8	4.0	1.6	6.5	7.5	14	a 9	3.5	.2
21	.9	4.3	1.6	a 6.5	7.5	a 14	9	3.0	a .2
22	a 2.0	4.3	.8	6.5	a 8	13	a 9	2.5	.3
23	3.1	3.7	1.0	6.5	8.5	13	9	2.5	.2
24	3.7	3.7	a .9	6.5	8.5	13	9	a 2.5	a .2
25	5	3.7	.8	6.5	a 9	a 13	a 9	2.5	.2
26	5	a 3.5	.2	6.5	9.5	13	9.5	a 2.4	.1
27	5	a 3.3	.2	6.5	9.5	13	10	a 2.2	a .1
28	4.9	3.1	.2	a 6.5	10	13	a 10	2.0	.1
29	a 4.8	3.2	.2	6.5	.....	13	a 9	a 1.5	a .1
30	4.6	2.8	.2	6.5	.....	13	9	1.0	.1
31	4.6	.....	a .2	6.5	.....	a 12	.....	.8	.....

a Gage not read; discharge interpolated.

NOTE.—No flow July 1 to Sept. 30.

Monthly discharge of Temescal Creek near Elsinore Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	5	0.4	1.71	105
November	4.4	2.8	3.67	218
December	3.1	.2	1.71	105
January	6.5	.2	2.77	170
February	10	6	7.18	399
March	14	9.5	12.3	756
April	12	9	10.2	607
May	8.5	.8	5.08	312
June	1.2	.1	.363	21.6
July	.0	.0	.000	.0
August	.0	.0	.000	.0
September	.0	.0	.000	.0
The year	14	.0	3.72	2,690

SAN ANTONIO CREEK NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ SE. ¼ sec. 36, T. 2 N., R. 8 W., at highway bridge about half a mile above Southern California Edison Co.'s power house (Sierra plant), 4 miles above mouth of canyon and 8 miles northeast of Claremont, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 25 to September 30, 1917 (discharge measurements only May 31 to Sept. 4, 1916).

GAGE.—Gurley graph water-stage recorder, with concrete well and house, on left bank at north end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading near gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; subject to shift during high stages. One channel except at extreme floods when left bank is overflowed.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 1.77 feet at 1.30 p. m. April 16 (discharge, 36 second-feet); minimum stage, from water-stage recorder, 0.52 foot during August and September (discharge, 0.7 second-foot).

DIVERSIONS.—Southern California Edison Co. diverts water for power development above the station. (See record.)

REGULATION.—None except as indicated above.

ACCURACY.—Stage-discharge relation practically permanent during period. Rating curve fairly well defined. Operation of water-stage recorder satisfactory, except January 25 to February 18; discharge estimated from record of flow in San Dimas Creek. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—Southern California Edison Co. furnished observer for water-stage recorder.

Discharge measurements of San Antonio Creek near Claremont, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. C. Dort	.....	1.8	May 2	H. J. Tompkins	1.40	18
Feb. 19	H. J. Tompkins	0.69	2.1	9	do	1.40	19
24	do	.84	4.5	26	do	1.19	12
Mar. 8	Dort and Tompkins	.94	5.2	July 19	Tompkins and Campbell	.56	1.0
30	J. C. Dort	1.38	17				
Apr. 5	H. J. Tompkins	1.48	20	Aug. 28	H. J. Tompkins	.52	.6
10	do	1.53	25	Sept. 18	do	.52	.6
21	J. C. Dort	1.36	15				

Daily discharge, in second-feet, of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.3	6.5	20	22	8	1.8	1.2	0.9
2	.....	2.3	6.5	20	20	8	1.8	1.1	.9
3	.....	2.3	6.5	21	19	8.5	1.5	1.0	.9
4	.....	2.3	6	21	20	8.5	1.4	1.0	.9
5	.....	2.3	6	21	19	7.5	1.3	1.0	.9
6	.....	2.3	6	21	18	7	1.3	1.0	.9
7	.....	2.3	6	21	18	7	1.3	1.0	.9
8	.....	2.3	6	22	18	7	1.3	1.0	.9
9	.....	2.3	6.5	25	18	6.5	1.3	1.0	.9
10	.....	2.3	7	24	18	6.5	1.2	1.0	.8
11	.....	2.3	8	22	17	6	1.2	1.0	.8
12	.....	2.3	6.5	22	15	5.5	1.2	1.0	.8
13	.....	2.2	6	21	15	5.5	1.2	1.0	.8
14	.....	2.2	6.5	21	15	6	1.2	1.0	.7
15	.....	2.1	6.5	21	15	5	1.2	1.0	.7
16	.....	2.1	6.5	27	14	5	1.2	1.0	.8
17	.....	2.5	7	22	14	4.5	1.2	1.0	.9
18	.....	2.3	7	21	18	4.0	1.1	1.0	.8
19	.....	2.1	7.5	20	16	3.5	1.0	1.0	.8
20	.....	2.1	7.5	18	15	3.3	1.0	1.0	.9
21	.....	2.2	8	16	13	3.2	1.0	1.0	.9
22	.....	4.3	8.5	16	12	3.0	1.0	1.0	.9
23	.....	4.4	9	16	12	3.0	1.0	.9	.9
24	.....	4.0	8.5	19	12	2.9	1.0	.9	1.0
25	2.5	7	9	22	12	2.8	1.0	.9	1.0
26	2.5	7	10	22	12	2.6	1.0	.9	1.0
27	2.5	7	11	24	11	2.3	1.7	.9	.9
28	2.4	6	13	22	10	2.2	1.3	.9	.8
29	2.4	.....	15	22	10	1.8	1.3	.9	.8
30	2.4	.....	17	21	9.5	1.8	1.2	.9	1.0
31	2.3	.....	20	.....	9	.....	1.2	.9	.....

Monthly discharge of San Antonio Creek near Claremont, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January 25-31	2.5	2.3	2.43	33.7
February	7	2.1	3.11	173
March	20	6	8.42	518
April	27	16	21.0	1,250
May	22	9	15.0	922
June	8.5	1.8	4.95	295
July	1.8	1.0	1.24	76.2
August	1.2	.9	.98	60.3
September	1.0	.7	.87	51.8
The period	.....	.....	.....	3,380

Combined discharge, in second-feet, of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	15	28	41	43	29	21	17	13
2	.....	15	28	41	41	29	21	17	13
3	.....	15	28	42	40	30	20	17	13
4	.....	15	27	42	41	30	20	17	13
5	.....	15	27	42	40	28	20	17	13
6	.....	15	27	42	39	28	20	17	13
7	.....	15	27	42	39	28	20	16	13
8	.....	15	27	43	39	28	20	16	13
9	.....	15	28	46	39	28	19	16	13
10	.....	15	28	45	39	28	19	16	12
11	.....	15	29	43	38	27	19	16	12
12	.....	15	28	43	36	26	19	16	12
13	.....	15	27	42	36	26	19	16	12
14	.....	15	28	42	36	27	19	16	12
15	.....	15	28	42	36	26	18	15	12
16	.....	16	28	48	35	26	18	15	12
17	.....	17	28	43	35	24	18	15	12
18	.....	17	28	42	39	23	18	15	12
19	.....	17	28	41	37	22	18	14	12
20	.....	17	28	39	36	22	17	14	12
21	.....	18	29	37	34	22	17	14	12
22	.....	23	30	37	33	22	17	14	12
23	.....	22	30	37	33	22	17	14	12
24	.....	22	30	40	33	22	17	14	12
25	16	28	30	43	33	22	16	14	12
26	16	28	31	43	33	22	17	14	12
27	16	28	32	45	32	21	20	14	12
28	16	27	34	43	31	21	19	14	11
29	15	.....	36	43	31	21	18	14	12
30	15	.....	38	42	30	21	18	14	12
31	15	.....	41	.....	30	.....	18	13	.....

NOTE.—For daily discharge of Southern California Edison Co.'s canal, see p. 52.

Combined monthly discharge of San Antonio Creek and Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January 25–31	16	15	15.6	217
February	28	15	18.0	1,000
March	41	27	29.5	1,810
April	46	37	42.0	2,500
May	43	30	36.0	2,210
June	30	21	25.0	1,490
July	21	16	18.6	1,140
August	17	13	15.2	935
September	13	11	12.3	732
The period	.....	.....	.....	12,000

NOTE.—For monthly discharge of Southern California Edison Co.'s canal, see p. 53.

SAN ANTONIO CREEK NEAR UPLAND, CALIF.

LOCATION.—In SW. ¼ sec. 36, T. 2 N., R. 8 W., below Southern California Edison Co.'s power house, 3½ miles above mouth of canyon, and 8 miles northwest of Upland, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 11, 1901, to September 30, 1917.

DISCHARGE.—Determined from gage-height record obtained at 10-foot rectangular weir in tailrace; excess water flowing over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1901–1917: Maximum mean daily discharge reported, 607 second-feet February 21, 1914 (no record for flood of January, 1916); minimum mean daily discharge reported, 3.4 second feet February 29, 1904.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Records for periods when flow of stream does not exceed 21 second-feet (capacity of power canal), probably excellent.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co., through H. A. Barre, chief engineer.

Daily discharge, in second-feet, of San Antonio Creek near Upland, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	13	11	12	13	22	25	29	31	19	16	13
2	14	13	12	12	13	22	25	29	30	20	16	12
3	14	13	12	12	13	22	25	29	29	19	15	12
4	14	12	12	12	13	22	25	29	29	19	15	12
5	14	14	12	12	13	22	25	29	29	19	15	12
6	15	14	12	12	13	22	25	29	29	19	15	12
7	15	13	12	12	13	22	25	29	29	19	15	12
8	15	13	12	12	13	22	25	29	29	18	15	12
9	15	13	12	12	13	22	25	29	29	18	15	12
10	15	13	12	12	13	23	25	29	27	18	14	11
11	15	13	12	12	13	23	25	29	27	18	14	12
12	15	13	12	12	13	23	25	29	27	18	14	11
13	14	12	12	12	13	23	25	27	27	18	14	11
14	14	12	12	12	13	23	25	27	26	17	14	12
15	14	12	12	12	13	23	25	27	26	17	14	11
16	14	12	12	12	14	23	25	27	25	17	14	12
17	14	12	12	12	14	23	25	27	24	17	14	11
18	14	12	12	12	14	23	25	27	24	17	14	11
19	14	12	12	14	14	23	25	36	24	17	13	11
20	14	12	12	13	16	23	25	36	24	17	14	11
21	14	12	12	13	16	23	25	35	24	17	13	11
22	14	12	12	14	18	23	25	35	24	16	13	11
23	14	12	11	14	18	23	25	35	23	16	14	11
24	14	12	17	14	18	23	25	35	24	16	13	11
25	12	12	17	13	20	23	25	35	23	16	13	11
26	12	12	14	13	22	23	25	35	23	16	13	11
27	12	12	12	13	22	23	25	31	23	22	13	11
28	12	12	12	13	22	23	25	31	23	18	13	11
29	13	12	12	13	.....	23	25	31	23	17	13	11
30	13	12	12	13	.....	23	29	31	21	16	13	11
31	14	.....	12	13	.....	25	.....	31	.....	16	13	.....

Monthly discharge of San Antonio Creek near Upland, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	15	11	13.8	849
November	14	12	12.4	738
December	17	11	12.3	756
January	14	12	12.5	769
February	22	13	15.1	839
March	25	22	22.8	1,400
April	29	25	25.1	1,490
May	36	27	30.5	1,880
June	31	21	25.9	1,540
July	22	16	17.6	1,080
August	16	13	14.0	861
September	13	11	11.4	678
The year	36	11	17.8	12,900

SOUTHERN CALIFORNIA EDISON CO.'S CANAL NEAR CLAREMONT, CALIF.

LOCATION.—In NW. ¼ sec. 1, T. 1 N., R. 8 W., at weir in tailrace of Sierra power house, on San Antonio Creek, 1½ miles below intake, and about 8 miles northeast of Claremont, Los Angeles County.

RECORDS AVAILABLE.—January 1 to September 30, 1917.

GAGE.—Hook gage which indicates head on weir; read by G. E. Leyer and B. F. Campbell, operators at power house.

DISCHARGE.—Computed from head on 10-foot rectangular weir.

ACCURACY.—Gage is read at 8 a. m. and 4 p. m. Daily discharge ascertained by observer by applying mean daily gage height to rating table for weir. Records good.

COOPERATION.—Discharge record furnished by Southern California Edison Co.

Canal diverts water from San Antonio Creek in the SE. ¼ sec. 25, T. 2 N., R. 8 W., 1 mile above gaging station on San Antonio Creek, near Claremont. This water is used for power development at Sierra power house, in NW. ¼ sec. 1, T. 1 N., R. 8 W., and is then returned directly to creek.

Daily discharge, in second-feet, of Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	13	21	21	21	21	19	15.5	12.5
2	12	13	21	21	21	21	19.5	15.5	12.5
3	12	13	21	21	21	21	19	15.5	12
4	12	13	21	21	21	21	19	15.5	12.5
5	12	13	21	21	21	21	19	15.5	12.5
6	12	13	21	21	21	21	19	15.5	12
7	12	13	21	21	21	21	19	15	12
8	12	13	21	21	21	21	19	15	12
9	12	13	21	21	21	21	18	15	12
10	12	13	21	21	21	21	18	14.5	11
11	12	13	21	21	21	21	18	14.5	11.5
12	12	13	21	21	21	21	18	15	11.5
13	12	13	21	21	21	21	17.5	14.5	11
14	12	13	21	21	21	21	17.5	14.5	11.5
15	12	13	21	21	21	21	17	14	11
16	12	13.5	21	21	21	21	17	14	11.5
17	12	14.5	21	21	21	19	17	14	11
18	12	14.5	21	21	21	19	17	14	11
19	14.5	14.5	21	21	21	19	17	13.5	11
20	13	15	21	21	21	19	16	13.5	11
21	13	15.5	21	21	21	19	16	13	11
22	13.5	18.5	21	21	21	19	16	13	11
23	13.5	17.5	21	21	21	19	16	13.5	11
24	13.5	17.5	21	21	21	19	16	13	11.5
25	13	21	21	21	21	19	15	13	11
26	13	21	21	21	21	19	16	13	10.5
27	13.5	21	21	21	21	19	18	13	11
28	13.5	21	21	21	21	19	17.5	13	10.5
29	13	.....	21	21	21	19	17	13	11
30	13	.....	21	21	21	19	16.5	13	11
31	13	.....	21	.....	21	.....	16.5	12.5	.....

Monthly discharge of Southern California Edison Co.'s canal near Claremont, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	14.5	12	12.5	769
February	21	13	15.0	833
March	21	21	21.0	1,290
April	21	21	21.0	1,250
May	21	21	21.0	1,290
June	21	19	20.1	1,200
July	19.5	15	17.5	1,080
August	15.5	12.5	14.1	867
September	12.5	10.5	11.4	678
The period				9,260

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER NEAR AZUSA, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 1 N., R. 10 W., near road crossing at mouth of canyon about half a mile above Southern California Edison Co.'s power house, and 2 miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—222 square miles.

RECORDS AVAILABLE.—1894 to September 30, 1917.

GAGE.—Staff in two sections on left bank at a rock point above the ford; read Dec. 24–30, January 19–24, and February 21 to March 31. A vertical staff at independent datum, 50 feet above regular gage above ford, was read October 2–22 and December 31 to January 3. Remainder of record is from a short vertical staff, installed January 3, 1917, at portal of abandoned tunnel 20 feet above regular gage. Original location of gage was just above ford at mouth of canyon. On account of frequent changes in channel it has been necessary to install numerous gages at points from 1,000 feet above ford to 600 feet below. The various gages used from time to time have usually been installed at independent datums. Gage read by B. Bunje.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above ford or by wading near gage.

CHANNEL AND CONTROL.—Gravel and boulders, shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 4 p m. December 24 (discharge determined from extension of rating curve, 3,900 second-feet); channel dry at gage for several months during year.

1894–1917: Maximum stage recorded, 12.0 feet January 18, 1916 (discharge, 40,000 second-feet); channel dry for several months each year.

DIVERSIONS.—Southern California Edison Co.'s power canal heads about 5 miles above station. Water was diverted through the tunnel about 500 feet above ford, beginning April 1, 1917.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curves fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records for October and December roughly approximate; fair for remainder of year.

Discharge measurements of San Gabriel River near Azusa, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Regular gage.	Upper gage.				Regular gage.	Upper gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Oct. 25	H. J. Tompkins	.....	.....	1.1	Mar. 6	F. C. Ebert	4.12	2.11	173
Jan. 3	F. C. Ebert	3.60	1.37	48	15	H. J. Tompkins	3.89	.....	133
9	H. J. Tompkins	.....	1.00	24	17	F. C. Ebert	3.85	1.74	92
16	F. C. Ebert	3.61	1.37	54	23	....do	3.81	1.70	94
26	....do	.....	1.46	61	26	....do	3.80	1.68	90
Feb. 9	....do	.....	1.20	36	Apr. 7	....do	3.55	1.48	58
15	H. J. Tompkins	.....	1.06	22	19	H. J. Tompkins	3.50	1.36	43
22	J. C. Dort	4.94	.....	582	25	....do	3.50	1.36	44
24	H. J. Tompkins	4.45	.....	256	May 17	F. C. Ebert	.....	1.02	20
24	F. C. Ebert	4.40	2.46	269	28	....do	.....	.72	4.2
25	....do	5.26	.....	748					

Discharge measurements of tunnel diversion on San Gabriel River above station near Azusa, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Discharge.	Date.	Made by—	Discharge.
		Sec.-ft.			*Sec.-ft.*
Apr. 7	F. C. Ebert	33	May 17	F. C. Ebert	20
25	H. J. Tompkins	36	28	....do	28

Daily discharge, in second-feet, of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	0	.....	17	45	290	87	41
2	320	.....	17	43	252	77	39
3	80	.....	48	40	218	71	37
4	30	.....	37	41	200	66	37
5	25	.....	32	41	176	63	31
6	55	.....	28	40	165	66	30
7	50	.....	26	39	147	58	30
8	35	.....	27	38	135	53	31
9	25	.....	26	37	165	63	31
10	35	.....	27	34	165	48	31
11	40	.....	26	31	135	44	30
12	30	.....	28	29	115	43	27
13	30	.....	29	26	115	41	24
14	25	.....	43	25	110	39	24
15	15	.....	50	20	110	104	22
16	10	.....	45	19	104	107	20
17	10	.....	57	58	100	63	19
18	8	.....	145	63	100	48	35
19	6	.....	215	73	100	39	31
20	3	.....	190	77	100	36	24
21	3	.....	140	182	100	36	20
22	2	.....	120	590	96	37	18
23	2	.....	100	355	94	39	19
24	1	3,900	80	270	92	41	22
25	1	310	67	730	90	44	20
26	1	165	62	490	90	50	17
27	.....	90	57	380	90	53	15
28	.....	56	55	332	90	50	4
29	.....	42	52	.....	100	48	.....
30	.....	24	49	.....	110	43	.....
31	.....	20	48	.....	110	.....	.....

NOTE.—No flow Oct. 27 to Dec. 23 and Mar. 29 to Sept. 30. Discharge, Oct. 2-26, estimated by comparison with records for nearby streams; Jan. 4-9 and 10-14 computed by shifting-control method.

Monthly discharge of San Gabriel River near Azusa, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	320	0	27.2	1,670
November	0	0	0	0
December	3,900	0	149	9,160
January	215	17	62.7	3,860
February	730	19	148	8,220
March	290	90	131	8,050
April	107	36	55.2	3,280
May	41	0	23.5	1,440
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The year	3,900	0	49.3	35,700

Combined daily discharge, in second-feet, of San Gabriel River and diversions near Azusa, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	73	66	107	135	380	197	161	116	60	50	29
2	410	72	67	107	133	342	192	159	115	59	48	27
3	170	72	76	138	130	308	196	157	114	59	44	27
4	120	72	79	127	131	290	191	157	114	58	45	28
5	115	77	73	122	131	266	188	151	113	57	44	27
6	145	75	71	118	130	255	191	150	112	57	43	27
7	140	75	70	110	129	237	181	150	112	56	40	27
8	125	73	70	111	128	225	178	151	110	55	39	27
9	115	72	70	110	127	255	183	151	108	54	38	25
10	125	71	68	111	124	255	173	151	106	52	38	24
11	130	70	67	110	121	225	169	150	104	51	37	24
12	120	71	66	112	119	205	168	147	100	51	37	24
13	120	70	65	113	116	205	166	144	97	50	37	24
14	115	68	64	127	115	200	164	144	92	50	36	24
15	105	68	63	137	110	200	189	142	89	48	34	24
16	100	68	63	135	109	194	192	140	81	46	34	24
17	100	68	65	147	148	190	188	129	79	45	33	24
18	98	67	65	235	153	190	173	145	77	45	33	24
19	96	68	65	305	163	190	164	141	75	43	32	23
20	93	68	65	280	167	190	161	134	73	42	32	24
21	93	67	65	230	272	190	161	130	71	44	32	24
22	92	66	65	210	680	186	162	128	70	42	31	24
23	92	66	62	190	445	184	164	129	69	42	34	27
24	91	66	3,990	170	360	182	166	132	69	43	32	27
25	86	67	400	157	820	180	170	130	68	44	32	27
26	81	67	255	152	580	180	170	127	68	42	30	27
27	76	66	180	147	470	180	173	125	66	44	30	24
28	78	67	138	145	422	180	170	122	63	76	29	26
29	77	67	129	142	.....	190	168	118	63	57	28	24
30	76	66	114	139	.....	200	163	117	64	57	27	24
31	74	.....	110	138	.....	200	.....	116	.....	51	27	.....

NOTE.—The above table includes diversions through tunnel 500 feet above ford and the Southern California Edison Co.'s canal, which diverts about 5 miles above station. For daily-discharge table of the power canal, see p. 57. Separate discharge table showing diversion through tunnel, not published; discharge estimated from current-meter measurements and observer's notes.

Monthly discharge of San Gabriel River and diversions near Azusa, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	410	74	114	0.514	0.59	7,010
November	77	66	69.4	.313	.35	4,130
December	3,990	62	221	.995	1.15	13,600
January	305	107	151	.680	.78	9,280
February	820	109	238	1.07	1.11	13,200
March	380	180	221	.995	1.15	13,600
April	197	161	176	.793	.88	10,500
May	161	116	140	.631	.73	8,610
June	116	63	88.6	.399	.45	5,270
July	76	42	51.0	.230	.27	3,140
August	50	27	35.7	.161	.19	2,200
September	29	23	25.4	.114	.13	1,510
The year	3,990	23	127	.572	7.78	92,000

NOTE.—Table includes diversions through tunnel 500 feet above ford and through Southern California Edison Co.'s canal. Discharge through tunnel estimated from discharge measurements and observer's notes as follows: April, 1,990 acre-feet; May, 1,600-acre-feet; June, 607 acre-feet. For monthly discharge of power canal see table, p. 57.

SOUTHERN CALIFORNIA EDISON CO.'S CANAL NEAR AZUSA, CALIF.

LOCATION.—At Southern California Edison Co.'s power house, 9 miles below intake on San Gabriel River and 1½ miles north of Azusa, Los Angeles County.

RECORDS AVAILABLE.—1896 to September 30, 1917.

DISCHARGE.—Computed from records showing kilowatt output of power plant on the assumption that 1 second-foot develops 25 kilowatts. Low-water record at power plant not reliable; discharge computed from weir records obtained at sand box, about one-fourth mile below intake.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge recorded, 1896–1917, was 90 second-feet in 1915 and 1917; no flow during periods in 1901 and 1912.

ACCURACY.—Records good.

The diversion dam for this canal is on San Gabriel River in the SE. ¼ SE. ¼ sec. 31, T. 2 N., R. 9 W., about 5 miles above gaging station on San Gabriel River near Azusa, at the mouth of the canyon. The water is used for power development at a point about 1½ miles north of Azusa. The water, after leaving the power plant, is divided for irrigation, a part being discharged into Azusa-Covina canal and the remainder into Duarte canal. During rainy season part of the water from the power plant is wasted back into San Gabriel River below gaging station.

Daily discharge, in second-feet, of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	73	66	90	90	90	90	90	90	60	50	29
2	90	72	67	90	90	90	90	90	90	59	48	27
3	90	72	76	90	90	90	90	90	90	59	44	27
4	90	72	79	90	90	90	90	90	90	58	45	28
5	90	77	73	90	90	90	90	90	90	57	44	27
6	90	75	71	90	90	90	90	90	90	57	43	27
7	90	75	70	84	90	90	90	90	90	56	40	27
8	90	73	70	84	90	90	90	90	90	55	39	27
9	90	72	70	84	90	90	90	90	90	54	38	25
10	90	71	68	84	90	90	90	90	90	52	38	24
11	90	70	67	84	90	90	90	90	90	51	37	24
12	90	71	66	84	90	90	90	90	88	51	37	24
13	90	70	65	84	90	90	90	90	87	50	37	24
14	90	68	64	84	90	90	90	90	84	50	36	24
15	90	68	63	87	90	90	45	90	83	48	34	24
16	90	68	83	90	90	90	45	90	76	46	34	24
17	90	68	65	90	90	90	90	90	74	45	33	24
18	90	67	65	90	90	90	90	90	72	45	33	24
19	90	68	65	90	90	90	90	90	71	43	32	23
20	90	68	65	90	90	90	90	90	70	42	32	24
21	90	67	65	90	90	90	90	90	69	44	32	24
22	90	66	65	90	90	90	90	90	68	42	31	24
23	90	66	62	90	90	90	90	90	67	42	34	27
24	90	66	90	90	90	90	90	90	67	43	32	27
25	85	67	90	90	90	90	90	90	66	44	32	27
26	80	67	90	90	90	90	90	90	67	42	30	27
27	76	66	90	90	90	90	90	90	65	44	30	24
28	78	67	82	90	90	90	90	90	62	76	29	26
29	77	67	87	90	.....	90	90	90	62	57	28	24
30	76	66	90	90	.....	90	90	90	63	57	27	24
31	74	.....	90	90	.....	90	.....	90	.....	51	27	.....

Monthly discharge of Southern California Edison Co.'s canal near Azusa, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	90	74	87.0	5,350
November	77	66	69.4	4,130
December	90	62	72.9	4,480
January	90	84	88.4	5,440
February	90	90	90.0	5,000
March	90	90	90.0	5,530
April	90	45	87.0	5,180
May	90	90	90.0	5,530
June	90	62	78.4	4,670
July	76	42	51.0	3,140
August	50	27	35.7	2,200
September	29	23	25.4	1,510
The year	90	23	72.0	52,200

ROGERS CREEK NEAR AZUSA, CALIF.

LOCATION.—In southwest corner of sec. 14, T. 1 N., R. 10 W., about half a mile above mouth of creek and 2¼ miles north of Azusa, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 8, 1916, to June 11, 1917 (discharge measurements only).

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Boulders, gravel, and solid rock; appears permanent.

DIVERSIONS.—None above.

REGULATION.—None.

Discharge measurements of Rogers Creek near Azusa, Calif., during the year ending Sept. 30, 1917.

[Made by H. J. Tompkins.]

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
	Sec.-ft.		*Sec.-ft.*		*Sec.-ft.*
Jan. 9	2.6	Mar. 15	5.9	Apr. 25	1.7
Feb. 15	1.6	Apr. 17	3.3	June 11	1.1

FISH CREEK NEAR DUARTE, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 15, T. 1 N., R. 10 W., about three-quarters of a mile above mouth of canyon and 4 miles northeast of Duarte, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 12, 1916, to September 30, 1917 (not complete).

GAGE.—Gurley graph water-stage recorder, with concrete well and house, installed July 28, 1917, on left bank three-fourths mile below mouth of canyon at same location and datum as vertical staff used until July 28, 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; appears permanent. Banks high and not subject to overflow. Control is an outcrop of bed rock; second outcrop, a short distance below, is probably the control at high water. Stage of zero flow is at gage height, 0.25 foot.

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Records good.

Discharge measurements of Fish Creek near Duarte, Calif., during the year ending Sept. 30, 1917.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 25	0.80	1.7	Feb. 28	1.70	21	May 26	.96	3.2
Dec. 5	.89	2.4	Mar. 15	1.18	8.6	June 11	.88	2.3
Jan. 9	1.02	4.4	Apr. 17	1.06	5.6	July 28	.53	.3
Feb. 15	.90	2.8	25	.94	3.7			

Daily discharge in second-feet, of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1917.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	0.3	0.2	11	.....	.2	.2	21	.....	.2	.2
2	.....	.3	.2	12	.....	.2	.2	22	.....	.2	.2
3	.....	.3	.2	13	.....	.2	.2	23	.....	.2	.2
4	.....	.2	.2	14	.....	.2	.2	24	.....	.2	.2
5	.....	.2	.2	15	.....	.2	.2	25	.....	.2	.2
6	.....	.2	.2	16	.....	.2	.2	26	.....	.2	.2
7	.....	.2	.2	17	.....	.2	.2	27	.....	.2	.2
8	.....	.2	.2	18	.....	.2	.2	28	0.3	.2	.2
9	.....	.2	.2	19	.....	.2	.2	29	.3	.2	.2
10	.....	.2	.2	20	.....	.2	.2	30	.3	.2	.2
								31	.3	.2	.....

Monthly discharge of Fish Creek near Duarte, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
August	0.3	0.2	0.21	12.9
September	.2	.2	.20	11.9

SAWPIT CREEK NEAR MONROVIA, CALIF.

LOCATION.—In SE. ¼ NW. ¼ sec. 13, T. 1 N., R. 11 W., at highway bridge just below junction of two main branches, about 2 miles north of Monrovia, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1916, to September 30, 1917.

GAGE.—Gurley graph water-stage recorder, with concrete well and shelter, on left bank at east end of highway bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; appears permanent; channel straight for 25 feet above gage and curved below. Banks high. Control is a concrete boulder dam built across channel just below gage; lowest point on crest of control is at elevation of 0.70 foot on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.64 feet at 3.30 p. m., December 24 (discharge, from extension of rating curve, 228 second-feet); stream dry April 7–16 and April 21 to September 30.

DIVERSIONS.—Part of the water supply for Monrovia is obtained from the two branches of Sawpit Creek above gage. See record for Monrovia pipe line near Monrovia, Calif.

REGULATION.—None.

ACCURACY.—Stage-discharge relation appears permanent. A fairly well defined rating curve, defined by measurements obtained after high water in December, was used throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for December 24 when hourly discharge was averaged. Records good.

COOPERATION.—Water-stage recorder attended by an employee of the city of Monrovia.

Discharge measurements of Sawpit Creek near Monrovia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 30	J. C. Dort	1.05	2.6	Feb. 22	J. C. Dort	1.75	45
Jan. 20	do	1.16	6.4	24	do	1.32	9.5
Feb. 15	H. J. Tompkins	.96	1.4	May 15	H. J. Tompkins	1.08	3.6
20	J. C. Dort	1.05	3.4	28	do	1.03	2.3
22	do	1.75	46				

Daily discharge, in second-feet, of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	.....	0.9	3.0	2.5	8.5	2.1	16	1.3	2.1	3.0	1.7	3.4	0.0
2	.....	1.1	3.4	2.5	8	2.1	17	1.1	2.1	2.9	2.5	3.2	1.4
3	.....	3.2	4.0	2.5	6.5	2.0	18	.9	2.1	3.2	2.3	3.2	2.1
4	.....	3.0	3.4	2.5	6	1.5	19	1.1	2.1	5.0	2.3	3.0	2.1
5	.....	2.7	3.0	2.5	5.5	.8	20	1.0	2.1	5.5	3.8	3.0	.7
6	.....	2.3	2.9	2.5	4.8	.2	21	.8	2.1	4.5	14	3.0	.....
7	.....	2.1	2.9	2.5	4.0	.0	22	.8	2.1	4.0	36	3.0	.....
8	2.1	2.1	2.9	2.3	3.6	.0	23	.9	2.5	3.8	17	2.9	.....
9	2.1	2.1	2.9	1.5	4.0	.0	24	.9	74	3.6	12	2.9	.....
10	2.1	2.1	2.7	1.5	4.2	.0	25	.9	14	3.4	17	2.9	.....
11	2.1	2.1	2.5	1.5	4.0	.0	26	1.0	6.5	3.2	14	2.9	.....
12	2.1	2.1	2.7	1.6	4.0	.0	27	1.0	4.5	2.9	10	2.7	.....
13	2.1	2.1	2.5	1.6	4.0	.0	28	.9	4.0	2.9	9.5	2.7	.....
14	2.1	2.1	2.5	1.6	3.8	.0	29	.9	4.0	2.7	.....	2.5	.....
15	1.6	2.1	2.9	1.5	3.6	.0	30	.9	3.0	2.7	.....	2.3	.....
							31	.....	3.0	2.7	.....	2.1	.....

NOTE—Stream dry Apr. 21 to Sept. 30.

Monthly discharge of Sawpit Creek near Monrovia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 8–30	2.1	0.8	1.33	60.7
December	74	.9	5.24	322
January	5.5	2.5	3.23	199
February	36	1.5	6.17	343
March	8.5	2.1	3.88	239
April	2.1	.0	.50	29.8
May	.0	.0	.0	.0
June	.0	.0	.0	.0
July	.0	.0	.0	.0
August	.0	.0	.0	.0
September	.0	.0	.0	.0
The period				1,190

Combined daily discharge, in second-feet, of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3.1	4.5	4.0	10	4.5	3.4	3.1	2.0	1.8	1.7
2	.....	3.3	4.9	4.0	9.5	4.7	3.4	3.1	2.0	1.8	1.6
3	.....	5.5	5.5	4.0	8	5	3.4	3.1	2.0	1.8	1.6
4	.....	4.7	4.9	4.0	7.5	4.9	3.4	3.1	2.0	1.8	1.6
5	.....	4.4	4.5	4.0	7	4.5	3.1	3.1	2.0	1.8	1.6
6	.....	4.0	4.4	4.0	6.5	3.8	3.1	3.0	2.0	1.8	1.6
7	.....	3.8	4.4	4.0	5.5	3.4	3.1	2.8	2.0	1.8	1.6
8	3.8	3.8	4.4	4.0	5.5	3.6	3.4	2.8	2.0	1.8	1.6
9	3.8	3.8	4.4	3.6	6	3.9	3.6	2.8	2.0	1.7	1.6
10	3.8	3.8	4.2	3.7	6	3.7	3.4	2.8	2.0	1.7	1.6
11	3.8	3.8	4.0	3.7	5.5	3.4	3.1	2.8	2.0	1.7	1.6
12	3.8	3.8	4.2	3.8	5.5	3.4	3.1	2.7	1.9	1.7	1.6
13	3.8	3.8	4.0	3.8	5.5	3.4	3.1	2.6	1.9	1.7	1.6
14	3.8	3.8	4.0	3.8	5.5	3.4	3.1	2.5	1.9	1.7	1.6
15	3.5	3.8	4.4	3.6	5.5	3.4	3.0	2.5	1.9	1.7	1.6
16	3.5	3.8	4.5	3.5	5	4.0	2.8	2.4	1.9	1.7	1.6
17	3.3	3.8	4.4	4.0	4.9	4.2	3.1	2.4	1.9	1.7	1.6
18	3.1	3.8	4.7	3.8	4.9	4.2	3.4	2.4	1.9	1.7	1.6
19	3.3	3.8	6.5	3.8	4.7	4.2	3.9	2.2	1.9	1.7	1.6
20	3.2	3.8	7	5.5	4.7	3.3	3.7	2.4	1.9	1.7	1.5
21	3.0	3.8	6	16	4.7	3.1	3.4	2.2	1.9	1.7	1.5
22	3.0	3.8	5.5	38	4.7	3.7	3.4	2.2	1.9	1.7	1.5
23	3.1	4.2	5.5	19	4.6	3.9	3.4	2.2	1.9	1.7	1.5
24	3.1	76	5	14	4.6	3.6	3.4	2.2	1.9	1.7	1.5
25	3.1	16	5	19	4.6	3.4	3.4	2.2	1.9	1.7	1.5
26	3.2	8	4.8	16	4.6	3.7	3.4	2.2	1.9	1.7	1.6
27	3.2	6	4.5	12	4.4	4.0	2.7	2.2	1.8	1.7	1.6
28	3.1	5.5	4.4	11	4.4	4.6	2.6	2.1	1.8	1.7	1.5
29	3.1	5.5	4.2	.....	4.2	4.0	2.7	2.1	1.8	1.7	1.5
30	3.1	4.5	4.2	.....	4.3	3.7	2.7	2.1	1.8	1.7	1.5
31	.....	4.5	4.2	.....	4.5	.....	2.8	.....	1.8	1.7	.....

NOTE.—For daily-discharge table of Monrovia pipe line, see p. 61.

Monthly discharge of Sawpit Creek and Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 8–30	3.8	3.0	3.37	154
December	76	3.1	6.97	429
January	7	4.0	4.74	291
February	38	3.5	7.99	444
March	10	4.2	5.57	342
April	5	3.1	3.89	231
May	3.9	2.6	3.21	197
June	3.1	2.1	2.54	151
July	2.0	1.8	1.92	118
August	1.8	1.7	1.73	106
September	1.7	1.5	1.57	93.4
The period				2,560

MONROVIA PIPE LINE NEAR MONROVIA, CALIF.

LOCATION.—Near southeast corner of sec. 14, T. 1 N., R. 11 W., 300 feet above settling reservoir at mouth of Sawpit Canyon, and about 1½ miles north of Monrovia, Los Angeles County.

RECORDS AVAILABLE.—May 18, 1916, to September 30, 1917.

GAGE.—Vertical staff in weir box; read by L. E. Allon, canyon guard.

DISCHARGE.—Determined by two rectangular weirs; left weir, 2.25 feet, right weir, 2.26 feet long, having end contractions. Crest of left weir is at zero gage height; crest of right weir is two hundredths foot lower at one end. Rating table, computed from weir table, has been checked by current-meter measurements made at mouth of intake pipe in weir box.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.46 foot at 7 a. m. April 28 (discharge, 4.6 second-feet); minimum stage, 0.21 foot at 5 p. m. September 20–25 and 28–30 (discharge, 1.4 second-feet).

1916–17: Maximum stage recorded, 0.49 foot May 18–19, 1916 (discharge, 5.0 second-feet); minimum stage, 0.21 foot September 20–25 and 28–30, 1917 (discharge, 1.4 second-feet).

ACCURACY.—Stage-discharge relation considered permanent since amount of backwater for any stage is probably constant. Gage read to hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by city of Monrovia.

The Monrovia pipe line furnishes part of the water supply of Monrovia. It obtains its water from two branches of Sawpit Creek. Most of this water is collected by tunnels driven into the sides of the canyon.

Daily discharge, in second-feet, of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.4	1.7	2.2	1.5	1.5	1.7	2.4	3.4	3.1	2.0	1.8	1.7
2	3.4	1.8	2.2	1.5	1.5	1.7	2.6	3.4	3.1	2.0	1.8	1.6
3	2.4	1.9	2.1	1.5	1.5	1.7	3.0	3.4	3.1	2.0	1.8	1.6
4	1.8	1.9	1.7	1.5	1.5	1.7	3.4	3.4	3.1	2.0	1.8	1.6
5	1.8	1.8	1.7	1.5	1.5	1.7	3.7	3.1	3.1	2.0	1.8	1.6
6	1.9	1.7	1.7	1.5	1.5	1.7	3.6	3.1	3.0	2.0	1.8	1.6
7	1.9	1.7	1.7	1.5	1.5	1.7	3.4	3.1	2.8	2.0	1.8	1.6
8	1.9	1.7	1.7	1.5	1.7	2.0	3.6	3.4	2.8	2.0	1.8	1.6
9	1.9	1.7	1.7	1.5	2.1	2.0	3.9	3.6	2.8	2.0	1.7	1.6
10	1.9	1.7	1.7	1.5	2.2	1.7	3.7	3.4	2.8	2.0	1.7	1.6
11	1.9	1.7	1.7	1.5	2.2	1.7	3.4	3.1	2.8	2.0	1.7	1.6
12	1.9	1.7	1.7	1.5	2.2	1.7	3.4	3.1	2.7	1.9	1.7	1.6
13	1.9	1.7	1.7	1.5	2.2	1.7	3.4	3.1	2.6	1.9	1.7	1.6
14	1.9	1.7	1.7	1.5	2.2	1.7	3.4	3.1	2.5	1.9	1.7	1.6
15	1.9	1.9	1.7	1.5	2.1	1.7	3.4	3.0	2.5	1.9	1.7	1.6
16	1.9	2.2	1.7	1.5	1.8	1.7	4.0	2.8	2.4	1.9	1.7	1.6
17	1.8	2.2	1.7	1.5	1.5	1.7	2.8	3.1	2.4	1.9	1.7	1.6
18	1.7	2.2	1.7	1.5	1.5	1.7	2.1	3.4	2.4	1.9	1.7	1.6
19	1.7	2.2	1.7	1.7	1.5	1.7	2.1	3.9	2.2	1.9	1.7	1.6
20	1.7	2.2	1.7	1.7	1.5	1.7	2.6	3.7	2.4	1.9	1.7	1.5
21	1.7	2.2	1.7	1.7	1.9	1.7	3.1	3.4	2.2	1.9	1.7	1.5
22	1.7	2.2	1.7	1.7	1.9	1.7	3.7	3.4	2.2	1.9	1.7	1.5
23	1.7	2.2	1.7	1.6	1.7	1.7	3.9	3.4	2.2	1.9	1.7	1.5
24	1.7	2.2	2.1	1.6	1.7	1.7	3.6	3.4	2.2	1.9	1.7	1.5
25	1.7	2.2	1.5	1.6	1.7	1.7	3.4	3.4	2.2	1.9	1.7	1.5
26	1.7	2.2	1.5	1.6	1.7	1.7	3.7	3.4	2.2	1.9	1.7	1.6
27	1.7	2.2	1.5	1.6	1.7	1.7	4.0	2.7	2.2	1.8	1.7	1.6
28	1.7	2.2	1.5	1.5	1.7	1.7	4.6	2.6	2.1	1.8	1.7	1.5
29	1.7	2.2	1.6	1.5	.....	1.7	4.0	2.7	2.1	1.8	1.7	1.5
30	1.7	2.2	1.5	1.5	.....	2.0	3.7	2.7	2.1	1.8	1.7	1.5
31	1.7	.....	1.5	1.5	.....	2.4	.....	2.8	.....	1.8	1.7	.....

NOTE.—Gage not read Sept. 18; discharge interpolated.

Monthly discharge of Monrovia pipe line near Monrovia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	3.4	1.7	1.91	117
November	2.2	1.7	1.98	118
December	2.2	1.5	1.72	106
January	1.7	1.5	1.54	94.7
February	2.2	1.5	1.76	97.7
March	2.4	1.7	1.75	108
April	4.6	2.1	3.39	202
May	3.9	2.6	3.21	197
June	3.1	2.1	2.54	151
July	2.0	1.8	1.92	118
August	1.8	1.7	1.73	106
September	1.7	1.5	1.57	93.4
The year	4.6	1.5	2.08	1,510

SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 10, T. 1 N., R. 11 W., at head of "Hermit's Falls," about 4 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 31, 1916, to September 30, 1917.

GAGE.—Stevens water-stage recorder on right bank of pool at head of Hermit's Falls.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage, or by wading at lower end of gage pool.

CHANNEL AND CONTROL.—Channel at gage is pool in bedrock; rough and steep above and below pool. Banks high, clean, and not subject to overflow. Control, which is bedrock, is the same for all stages and is permanent. Stage of zero flow is at gage height 0.47 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, about 4.50 feet (clock was stopped but pencil indicated maximum stage) December 24 (discharge, from extension of rating curve, 224 second-feet); minimum stage from water-stage recorder, 0.75 foot September 18 (discharge, 0.4 second-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACURACY.—Stage-discharge relation permanent. Rating curve well defined. Water-stage recorder not operating satisfactorily during November, December, and January. Mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for November, December, and January; good for remainder of year.

Discharge measurements of Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	H. J. Tompkins	1.05	2.9	Feb. 23	H. J. Tompkins	2.31	55
Feb. 3	do	1.22	5.2	Mar. 2	J. C. Dort	1.74	26
20	do	1.59	18	Apr. 18	H. J. Tompkins	1.22	5.5
22	do	2.89	93	Sept. 4	do	.83	.5
22	do	2.85	91	28	do	.78	.3
23	do	2.32	50				

Daily discharge, in second-feet, of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7.0	2.8	2.1	5.5	6	29	6.5	4.5	3.6	1.5	1.0	0.6
2	32	2.8	2.5	5.5	5.5	25	6.5	4.3	3.2	1.5	.9	.6
3	8.0	2.8	6.5	5.5	5.5	22	6	4.3	3.0	1.5	.8	.6
4	5.0	2.8	3.6	6.5	5	20	6	4.3	3.3	1.4	.8	.6
5	4.5	3.0	2.9	6	4.8	19	5.5	4.2	3.2	1.6	.8	.6
6	9.0	3.0	2.8	5	4.8	17	5.5	3.8	3.0	1.7	.8	.5
7	5.5	2.8	2.8	4.5	4.7	16	5.5	4.0	2.9	1.7	.8	.5
8	4.7	2.8	2.8	4.5	4.5	15	5.5	4.5	2.9	1.6	.8	.5
9	4.3	2.8	2.7	4.0	4.5	17	7	4.5	2.8	1.3	.7	.5
10	6.0	2.8	2.7	4.0	4.5	16	6.5	4.3	2.8	1.3	.7	.4
11	4.7	2.8	2.7	4.5	4.3	15	6	4.3	2.8	1.3	.8	.4
12	4.3	3.0	2.6	4.5	4.3	13	5.5	4.2	2.6	1.4	.8	.4
13	4.2	2.8	2.6	5	4.3	13	5	4.2	2.4	1.3	.8	.5
14	4.2	2.8	2.6	4.7	4.2	13	5	3.8	2.3	1.3	.8	.5
15	3.8	2.7	2.6	6	4.0	12	5	3.6	2.1	1.2	.8	.5
16	3.0	2.7	2.5	5.5	3.8	11	9	3.6	1.9	1.2	.8	.4
17	2.9	2.6	2.5	5	6.5	10	7	3.6	1.7	1.0	.8	.4
18	3.0	2.6	2.5	7	5.5	9.5	5.5	3.6	1.7	1.0	.7	.4
19	2.9	2.5	2.4	24	5.5	9.5	5.5	6.5	1.8	1.0	.8	.4
20	2.8	2.5	2.4	20	16	9.5	4.7	7	1.9	1.0	8	.4
21	2.8	2.4	2.4	15	43	9.5	4.3	4.8	1.9	1.0	.8	.4
22	3.0	2.4	2.4	12	86	8.5	4.3	4.2	1.9	1.0	.8	.4
23	3.0	2.3	3.0	11	56	8	4.5	4.3	1.9	1.1	.8	.4
24	2.9	2.3	100	10	39	8	4.3	4.7	1.9	1.1	.8	.4
25	2.5	2.2	25	9	56	7.5	4.3	4.7	1.8	1.1	.8	.4
26	2.5	2.2	13	8.5	48	7	4.5	4.3	1.8	1.1	.8	.4
27	2.6	2.1	7.5	8	40	7	4.8	4.0	1.7	1.0	.8	.4
28	2.9	2.1	6.5	8	34	7	5.5	3.8	1.6	1.1	.6	.4
29	2.9	2.0	6.0	7.5	.....	7	5.5	3.8	1.6	1.1	.6	.4
30	2.8	2.0	5.5	6.5	.....	7	4.7	4.0	1.5	1.0	.6	.5
31	2.8	.....	5.5	6.5	.....	7	.....	4.0	.....	.9	.7	.....

NOTE.—No gage-height record Oct. 31 to Nov. 28; Dec. 7 to Jan. 12; Jan. 25–29; and Sept. 19–27; discharge estimated from records of flow for nearby streams, except Sept. 19–27 for which it was interpolated.

Monthly discharge of Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	32	2.5	4.92	303
November	3.0	2.0	2.58	154
December	100	2.1	7.54	464
January	24	4.0	7.72	475
February	86	3.8	18.2	1,010
March	29	7.0	12.7	781
April	9	4.3	5.51	328
May	7	3.6	4.31	265
June	3.6	1.5	2.32	138
July	1.7	.9	1.24	76.2
August	1.0	.6	.78	48.0
September	.6	.4	.46	27.4
The year	100	.4	5.62	4,070

LITTLE SANTA ANITA CREEK NEAR SIERRA MADRE, CALIF.

LOCATION.—About the center of W. ½ sec. 9, T. 1 N., R. 11 W., 2 miles northeast of Sierra Madre, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 29, 1916, to September 30, 1917. Occasional discharge measurements April 15 to August 29, 1916.

GAGE.—Gurley graph water-stage recorder on left bank about 150 feet below Scherer's cabin.

DISCHARGE MEASUREMENTS.—Made from wooden bridge near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; permanent. One channel at all stages; straight for 75 feet above control. Right bank is rock cliff; left bank is stone wall 5 feet high which is probably above maximum stage. Control is small concrete dam, with traingular notch at left end, just below gage. Stage of zero flow is at gage height, 0.70 foot; top of dam at gage height, 1.50 feet.

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Little Santa Anita Creek near Sierra Madre, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	J. C. Dort	1.35	1.0	Jan. 6	H. J. Tompkins	1.40	1.0
23	H. J. Tompkins	1.25	.5	20	do	1.60	2.5
Nov. 12	do	1.22	.4	Feb. 10	do	1.32	.7
19	do	1.20	.5	20	do	1.56	1.9
26	do	1.20	.4	21	do	1.77	6.3
Dec. 31	J. C. Dort	1.39	1.2	24	J. C. Dort	1.72	6.1

Daily discharge, in second-feet, of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.8	0.4	0.5	0.9	1.0	4.8	1.1	0.9	0.8	0.5	0.3	0.2
2	.8	.4	.7	.9	.9	4.3	1.0	.9	.8	.4	.2	.2
3	.8	.4	1.8	1.1	.9	3.4	1.0	.9	.7	.4	.2	.1
4	.8	.4	.7	1.1	.9	3.2	1.0	.8	.7	.4	.2	.1
5	.8	.5	.6	1.0	.9	3.0	1.0	.8	.7	.4	.2	.1
6	.8	.5	.6	1.0	.8	2.7	1.0	.8	.7	.4	.2	.1
7	.8	.5	.5	1.0	.8	2.5	1.0	.8	.7	.3	.2	.1
8	.8	.4	.5	.9	.8	2.5	1.0	.9	.6	.3	.2	.1
9	.8	.4	.5	.9	.8	2.5	1.2	.9	.6	.3	.2	.1
10	.8	.4	.5	.9	.8	2.2	1.0	.9	.6	.8	.2	.1
11	.8	.4	.4	.8	.8	1.2	1.0	.8	.7	.3	.2	.1
12	.8	.5	.4	.9	.7	2.2	.9	.8	.6	.3	.2	.1
13	.7	.4	.4	.8	.7	2.1	.9	.7	.6	.3	.2	.1
14	.7	.4	.4	.8	.7	1.9	.9	.7	.6	.3	.2	.1
15	.6	.4	.4	1.0	.7	1.9	1.0	.7	.6	.3	.2	.1
16	.6	.4	.4	1.0	.7	1.8	1.2	.7	.6	.3	.2	.1
17	.6	.4	.4	.9	1.2	1.7	1.0	.8	.6	.3	.2	.1
18	.6	.4	.4	1.1	.9	1.6	1.0	1.6	.6	.2	.2	.1
19	.6	.4	.4	2.7	1.0	1.6	.9	1.1	.5	.2	.2	.1
20	.6	.4	.4	2.5	1.8	1.5	.8	1.0	.5	.2	.2	.1
21	.6	.4	.4	2.3	7.5	1.4	.8	.9	.4	.2	.2	.1
22	.6	.4	.4	1.9	12	1.3	.8	.9	.4	.3	.2	.1
23	.6	.4	.4	1.7	8	1.3	.8	.9	.4	.3	.2	.1
24	.5	.4	14	1.6	5.5	1.3	.8	1.0	.5	.3	.2	.2
25	.5	.4	4.3	1.4	7.5	1.2	.8	.9	.5	.2	.2	.1
26	.5	.4	2.5	1.3	6.5	1.2	.8	.9	.5	.2	.2	.1
27	.5	.4	1.8	1.2	6	1.2	.9	.8	.5	.3	.2	.1
28	.5	.4	1.4	1.2	5	1.1	1.0	.8	.4	.2	.2	.1
29	.4	.4	1.5	1.2	.....	1.1	1.0	.8	.4	.3	.2	.1
30	.4	.4	1.2	1.1	.....	1.1	.9	.8	.5	.3	.2	.1
31	.4	.....	1.0	1.0	.....	1.1	.....	.8	.....	.3	.2	.....

NOTE.—Water-stage recorder not in operation Oct. 2–9, 17–22, 29; Mar. 29; June 17–22; July 15–20; and Sept. 29–30; discharge interpolated.

Monthly discharge of Little Santa Anita Creek near Sierra Madre, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.8	0.4	0.648	39.8
November	.5	.4	.413	24.6
December	14	.4	1.28	78.7
January	2.7	.8	1.23	75.6
February	12	.7	2.71	151
March	4.8	1.1	2.03	125
April	1.2	.8	.950	56.5
May	1.6	.7	.871	53.6
June	.8	.4	.577	34.3
July	.5	.2	.300	18.4
August	.3	.2	.203	12.5
September	.2	.1	.110	6.5
The year	14	.1	.93	676

SAN DIMAS CREEK NEAR SAN DIMAS, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 25, T. 1 N., R. 9 W., at mouth of San Dimas Canyon, 3 miles northeast of San Dimas, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 3, 1916, to September 30, 1917 (discharge measurements only, April 14 to September 4, 1916).

GAGE.—Gurley graph water-stage recorder, with concrete well and house, on left bank at mouth of canyon, just above concrete control.

DISCHARGE MEASUREMENTS.—Made by wading at various sections above gage.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and boulders; shifting. Control is low concrete dam built across channel just below gage well. Gravel fills in above and below dam affecting stage-discharge relation. Left bank steep and not subject to overflow; right bank is brushy and will be overflowed during high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.90 feet at 4 p. m. December 24 (discharge determined from extension of rating curve, 770 second-feet); stream dry at least part of the time during October and November.

DIVERSIONS.—None above.

ACCURACY.—Stage-discharge relation changed by deposits of gravel above and below concrete control. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except as indicated in note to daily discharge table. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except December 24, when hourly discharge was averaged. Records good.

COOPERATION.—San Dimas Water Co. furnished observer for water-stage recorder.

Discharge measurements of San Dimas Creek near San Dimas, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	J. C. Dort		5.2	Mar. 12	J. C. Dort	1.74	10
Dec. 16	do	1.04	3.6	17	H. J. Tompkins	1.72	8.9
30	do	1.80	8.6	Apr. 5	do	1.66	6.0
Jan. 20	do	1.94	18	19	J. C. Dort	1.19	5.7
Feb. 15	H. J. Tompkins	1.64	5.0	26	H. J. Tompkins	1.15	5.5
20	J. C. Dort	1.74	12	May 9	do	1.20	5.8
22	do	2.27	81	27	do	1.18	5.8
24	H. J. Tompkins	1.83	21	July 12	do	.82	.97
28	do	1.80	22	29	do	.78	.75
Mar. 7	J. C. Dort	1.74	11	Sept. 18	do	.62	.21

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Daily discharge, in second-feet, of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	8.5	6	16	6.5	6	5	1.4	0.7	0.3
2	.....	8.5	6	13	6.5	5.5	4.8	1.3	.7	.3
3	5	11	5.5	11	6.5	5.5	4.6	1.1	.7	.3
4	4.2	10	5.5	11	6.5	5.5	4.6	1.2	.7	.3
5	3.7	8.5	5.5	11	6.5	4.6	4.6	1.3	.6	.3
6	3.7	8.5	5.5	11	6.5	4.3	4.6	1.4	.6	.3
7	3.6	8.5	5.5	11	6.5	4.3	4.5	1.4	.6	.3
8	3.6	8.5	5.5	11	6.5	5.5	4.0	1.2	.6	.3
9	3.6	8.5	5.5	12	6.5	6.5	3.7	1.1	.5	.3
10	3.6	8.5	5.5	11	6.5	6.5	3.7	1.1	.4	.4
11	3.5	8.5	5.5	11	6	5.5	3.7	1.1	.4	.4
12	3.5	8.5	4.9	11	6	4.3	3.7	1.1	.4	.4
13	3.5	8.5	4.9	11	6	4.3	3.5	1.1	.4	.3
14	3.5	8.5	4.9	11	6	4.8	3.2	1.1	.4	.3
15	3.5	9	4.9	10	6	4.8	2.9	1.0	.4	.3
16	3.5	10	4.9	10	8	4.8	2.4	.9	.4	.3
17	3.5	8.5	13	9	7	4.6	1.8	.8	.4	.2
18	3.5	9	8.5	8.5	6.5	13	1.6	.8	.3	.2
19	3.5	24	7	8.5	6	12	1.5	.8	.3	.2
20	3.5	20	13	7.5	5.5	8.5	1.5	.8	.3	.2
21	3.5	15	18	7.5	5	7	1.5	.8	.3	.3
22	3.5	14	58	7	5.5	6	1.5	.8	.3	.3
23	3.7	12	31	7	5.5	7.5	1.6	.8	.3	.3
24	250	14	24	6.5	5	8	1.7	.8	.3	.3
25	73	13	36	6.5	4.6	8	1.7	.8	.3	.3
26	23	11	29	6.5	5	7.5	1.7	.8	.3	.3
27	20	7	25	6.5	6	5.5	1.7	.8	.3	.3
28	15	7	19	6.5	8	5.5	1.6	.8	.3	.2
29	8.5	6.5	.....	6.5	7.5	5.5	1.5	.8	.3	.2
30	8.5	6.5	.....	6.5	7	6.5	1.4	.7	.3	.2
31	8.5	6.5	.....	6.5	.....	6.5	.....	.7	.3	.....

NOTE.—No gage-height record Apr. 8 and 29; June 10–11; July 20–27; Aug. 11–12 and 25–31; Sept. 15–17 and 19–30; discharge interpolated.

Monthly discharge of San Dimas Creek near San Dimas, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
December 3–31	250	3.5	16.7	961
January	24	6.5	10.2	627
February	58	4.9	13.1	728
March	16	6.5	9.32	573
April	8	4.6	6.24	371
May	13	4.3	6.27	386
June	5	1.4	2.86	170
July	1.4	.7	.99	60.9
August	.7	.3	.42	25.8
September	.4	.2	.29	17.3
The period	.....	.....	.....	3,920

LOS ANGELES RIVER BASIN.

PACOIMA CREEK NEAR SAN FERNANDO, CALIF.

LOCATION.—In SE. ¼ NE. ¼ sec. 24, T. 3 N., R. 15 W., 600 feet above mouth of canyon and 4 miles northeast of San Fernando, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 31, 1916, to September 30, 1917 (not complete).

GAGE.—Gurley graph water-stage recorder, with concrete well and house, on left bank about 600 feet above mouth of canyon; installed December 2, 1916. Gage previously used was a staff fastened to a boulder on left bank, 216 feet above water-stage recorder, at an independent datum and with different control.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet upstream from gage well, or by wading at gage.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and boulders; not permanent; left bank is steep rock cliff; right bank sloping and covered with brush and trees. Control is a low boulder and concrete dam built across channel about 7 feet below gage well. Lowest point on crest of control is at elevation of 1.1 feet on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.68 feet at 4 p. m. December 24 (discharge, determined from extension of rating curve, 1,440 second-feet); stream dry July 11 to September 30.

DIVERSION.—None above station. There is a diversion just below control.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed by shifting of gravel above control. Rating curves well defined below 200 second-feet. Water-stage recorder not in operation December 31 to January 5 and January 28 to February 1; record March 6–12 not reliable as a gravel bar formed between channel and gage. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except for December 24 and 25 when hourly discharge was averaged. Records good.

Discharge measurements of Pacoima Creek near San Fernando, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 29	J. C. Dort	2.05	23	Mar. 23	H. J. Tompkins	1.96	18
Jan. 10	H. J. Tompkins	1.98	11	31	do	1.92	14
19	J. C. Dort	2.04	20	Apr. 11	do	1.90	12
Feb. 2	H. J. Tompkins	1.98	10	12	J. C. Dort	1.76	9.9
13	do	1.95	8.1	23	H. J. Tompkins	1.75	9.0
16	do	2.13	6.1	May 3	do	1.74	7.3
19	Ernest Tompkins	2.18	13	12	do	1.72	5.8
21	J. C. Dort	2.49	136	June 8	do	1.67	2.5
23	do	2.60	161	July 1	do	1.50	.1
26	H. J. Tompkins	2.37	98	Sept. 12	do	.....	Dry.
Mar. 5	do	2.16	48	14	do	.....	Dry.
14	J. C. Dort	2.03	26	15	do	.....	Dry.

Daily discharge, in second-feet, of Pacoima Creek near San Fernando, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	23	12	68	13	8.5	4.5	0.1
2	2.5	21	12	64	12	7.5	4.5	.1
3	4.5	19	12	57	11	7.5	4.1	.1
4	5	17	12	55	11	6.5	3.7	.1
5	4	15	12	53	10	6.5	3.7	.1
6	4	14	11	50	9.5	6.5	3.7	.05
7	4	14	11	46	9.5	6.5	3.3	.05
8	4	13	11	43	10	6.5	3.3	.05
9	3	12	10	39	11	6.5	3.3	.05
10	3	12	10	36	11	6.5	2.9	.05
11	3	11	10	32	12	6.5	2.9	.....
12	3	12	10	29	10	6.5	3.3	.....
13	2.5	14	9.5	26	10	5.5	2.5	.....
14	2.5	14	8.5	26	10	5.5	2.1	.....
15	2.5	14	7.5	25	11	6.5	1.3	.....
16	2.5	14	7.0	24	12	6.5	.9	.....
17	2.5	13	11	22	13	6.5	.5	.....
18	2.5	13	11	22	11	8.5	.4	.....
19	2.5	19	11	21	10	12	.4	.....
20	2.5	17	37	20	9.0	10	.4	.....
21	2.5	16	141	19	8.5	8.5	.4	.....
22	2.5	14	232	18	8.5	6.5	.4	.....
23	2.5	14	165	17	8.5	5.5	.4	.....
24	425	14	120	16	9.0	5.5	.3	.....
25	114	14	123	16	9.0	6.5	.3	.....
26	64	14	95	16	9.0	6.5	.3	.....
27	37	14	88	15	10	5.5	.3	.....
28	28	14	78	15	10	5.5	.3	.....
29	27	14	.....	15	9.0	5.5	.2	.....
30	27	14	.....	14	8.5	4.5	.1	.....
31	25	13	.....	14	.....	4.5	.....	.....

NOTE.—No gage-height record Dec. 31 to Jan. 5 and Jan. 28 to Feb. 1; discharge estimated from Arroyo Seco record. Discharge Mar. 6–12 interpolated as gage-height record was not reliable.

Monthly discharge of Pacoima Creek near San Fernando, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
December 2-31	425	2.5	27.2	1,620
January	23	11	14.7	904
February	232	7.0	45.6	2,530
March	68	14	30.1	1,850
April	13	8.5	10.2	607
May	12	4.5	6.70	412
June	4.5	.1	1.82	108
July	.1	.00	.024	1.5
The period				8,030

NOTE.—No flow July 11 to Sept. 30.

TUJUNGA CREEK NEAR SUNLAND, CALIF.

LOCATION.—About in center of sec. 32, T. 3 N., R. 13 W. (unsurveyed), at a partly constructed and abandoned dam, 2 miles above mouth of canyon and 4 miles northeast of Sunland, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 28, 1916, to September 30, 1917 (discharge measurements only, April 1 to August 27, 1916).

DISCHARGE MEASUREMENTS.—Made from cable about 1,000 feet below gage or by wading at various sections near dam.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; apparently permanent. Control is concrete dam which has a notch in center about 20 feet long and 1 foot deep with steel angle set in the notch near downstream face. Stage of zero flow, about gage height 0.45 foot.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 3.35 feet at 4.30 p. m. December 24 (discharge, determined from extension of rating curve, 800 second-feet); minimum stage from water-stage recorder, 0.47 foot at 5 p. m. August 29 (discharge, 0.2 second-foot).

DIVERSIONS.—Two or three ranches divert a part of the low-water flow for irrigation above station. There are two small diversions between gage and mouth of canyon.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Frequent discharge measurements have been obtained and rating curve is well defined below 250 second-feet. Operation of water-stage recorder was generally satisfactory but gage-height record was in error, December 28 to February 5, as end of intake pipe was covered with gravel. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except on December 24-25, when hourly discharge was averaged. Records excellent except for December 28 to February 5, when discharge was estimated from record of flow of Pacoima Creek and Arroyo Seco.

Discharge measurements of Tujunga Creek near Sunland, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	J. C. Dort	0.77	12	Mar. 31	J. C. Dort	1.06	32
Jan. 16	H. J. Tompkins	(a)	33	Apr. 24	H. J. Tompkins	.94	22
Feb. 6	do	1.07	33	May 5	do	.86	18
21	J. C. Dort	1.86	124	June 10	do	.74	11
23	do	2.09	170	Aug. 2	do	.52	1.7
27	do	1.84	123	Sept. 1	do	.50	.4
Mar. 6	H. J. Tompkins	1.38	61	12	do	.49	.4
19	J. C. Dort	1.16	41	27	do	.49	.4

a Correct gage height not known as intake pipe was covered with gravel.

Daily discharge, in second-feet, of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	10	14	32	33	87	30	20	15	3.3	1.9	0.5
2	.....	11	15	32	33	81	29	20	14	3.0	1.6	.5
3	.....	12	20	33	33	75	28	19	13	3.0	1.2	.5
4	.....	12	17	32	33	70	26	17	13	3.0	1.2	.8
5	.....	13	15	32	33	64	25	17	14	3.0	.8	.5
6	.....	13	15	32	33	62	24	15	14	3.0	.8	.5
7	.....	13	14	31	32	59	24	16	12	3.0	.8	.5
8	.....	12	15	31	32	57	25	18	12	2.6	.5	.8
9	.....	12	15	31	31	58	29	20	11	2.6	.5	.5
10	.....	12	14	31	30	61	28	21	10	2.6	.4	.5
11	.....	13	14	31	29	58	26	20	10	2.2	.5	.5
12	.....	14	14	32	29	54	25	18	10	2.2	.5	.5
13	.....	13	14	32	29	51	24	17	9.5	2.2	.5	.5
14	.....	12	14	31	28	52	23	16	8	1.9	.5	.5
15	.....	12	14	31	26	50	23	16	7	1.9	.5	.4
16	.....	12	14	33	25	46	30	16	6	1.6	.4	.4
17	.....	13	14	35	39	44	37	16	5.5	1.6	.4	.4
18	.....	13	14	40	33	42	30	21	5.5	1.6	.4	.4
19	.....	14	14	59	34	40	28	23	5.5	1.2	.4	.4
20	.....	14	15	49	64	40	26	20	5.5	1.2	.4	.5
21	.....	13	15	43	120	40	24	18	4.9	1.2	.4	.5
22	.....	14	15	41	182	38	24	17	4.9	1.2	.4	.5
23	.....	14	15	39	166	36	24	19	4.4	1.2	.4	.5
24	.....	14	288	37	130	35	23	19	4.4	1.2	.4	.5
25	.....	14	161	36	182	34	21	19	4.0	1.2	.4	.4
26	.....	14	66	35	160	33	21	19	4.0	1.2	.4	.4
27	.....	14	34	35	125	32	21	17	4.4	1.2	.4	.4
28	8.5	14	33	35	101	32	24	15	4.0	1.2	.4	.4
29	10	14	32	35	.....	32	24	15	3.3	1.9	.3	.4
30	10	14	32	34	.....	32	21	17	3.3	1.9	.4	.5
31	10	.....	32	33	.....	32	.....	17	.....	1.6	.4	.....

NOTE.—Water-stage recorder was not in satisfactory operation Dec. 1–6; Dec. 28 to Feb. 5; and Sept. 24–26; discharge for these periods interpolated except Dec. 28 to Feb. 5 when discharge was estimated from hydrographs for Pacoima Creek and Arroyo Seco.

Monthly discharge of Tujunga Creek near Sunland, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October 28–31	10	8.5	9.62	76.3
November	14	10	13.0	774
December	288	14	32.8	2,020
January	59	31	35.3	2,170
February	182	25	65.2	3,620
March	87	32	49.3	3,030
April	37	21	25.6	1,520
May	23	15	18.0	1,110
June	15	3.3	8.07	480
July	3.3	1.2	1.99	122
August	1.9	.3	.60	36.9
September	.8	.4	.49	29.2
The period	.....	.....	.....	15,000

HAINES CREEK NEAR TUJUNGA, CALIF.

LOCATION.—In NE. ¼ NE. ¼ sec. 18, T. 2 N., R. 13 W., about 800 feet above mouth of canyon and 1½ miles northeast of Tujunga, Los Angeles County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 7 to September 30, 1917.

GAGE.—Gurley graph water-stage recorder with concrete well and house, on right bank, just above concrete control, about 800 feet above mouth of canyon.

DISCHARGE MEASUREMENTS.—Made by volumetric method, when discharge was very small, and on crest of dam. A bridge has been built 4 feet above dam for use during high water.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel overlying solid rock; permanent. Banks high and fairly clean. A concrete dam, having a maximum height of about 5 feet above bed rock, was built across the channel at downstream face of gage well. A 12-foot concrete wing wall was constructed at left end of dam. Crest of dam has a trapezoidal notch 6 inches wide on bottom and 1 foot deep, making control more sensitive for low stages. Zero flow, gage height 0.23 foot.

EXTREMES OF DISCHARGE.—Maximum stage during period from water-stage recorder, 0.60 foot at 4 a. m. February 22 (discharge, 0.48 second-foot); minimum stage from water-stage recorder, 0.32 foot September 20–30 (discharge, 0.03 second-foot).

DIVERSIONS.—About a mile above the station a tunnel has been driven into the stream bed and a 4-inch pipe carries the water past the gage. This water is used for domestic supply at Tujunga. A similar tunnel, a short distance below the station, develops a small supply during the greater part of the year.

REGULATION.—A large number of small check dams, constructed of brush and boulders, have been built across the stream channel in the upper part of the drainage basin.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory throughout period. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent.

Discharge measurements of Haines Creek near Tujunga, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 16	H. J. Tompkins	0.50	0.25
Apr. 2	J. C. Dort	.50	.25
12	do	.48	.25

Daily discharge, in second-feet, of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1917.

Day.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	0.35	0.27	0.17	0.15	0.10	0.06	0.05
2	.....	.35	.27	.17	.17	.10	.06	.05
3	.....	.35	.25	.17	.17	.09	.06	.05
4	.....	.37	.25	.17	.17	.09	.06	.05
5	.....	.37	.23	.17	.15	.09	.06	.05
6	.....	.37	.23	.17	.14	.09	.06	.05
7	0.33	.39	.25	.17	.12	.09	.06	.05
8	.33	.39	.25	.17	.12	.09	.06	.05
9	.35	.39	.27	.17	.14	.07	.06	.05
10	.29	.39	.27	.17	.14	.07	.06	.05
11	.29	.37	.25	.17	.14	.07	.06	.05
12	.31	.37	.23	.17	.12	.09	.06	.05
13	.31	.35	.23	.17	.11	.07	.06	.05
14	.29	.35	.23	.15	.10	.06	.06	.05
15	.27	.33	.23	.15	.10	.06	.06	.05
16	.27	.33	.25	.15	.09	.05	.05	.05
17	.33	.33	.23	.15	.09	.05	.05	.04
18	.27	.33	.23	.18	.09	.05	.05	.04
19	.29	.33	.23	.17	.10	.06	.05	.04
20	.31	.31	.23	.17	.10	.06	.05	.03
21	.41	.31	.23	.17	.10	.06	.05	.03
22	.43	.31	.22	.17	.10	.06	.05	.03
23	.35	.31	.22	.17	.10	.06	.05	.03
24	.35	.31	.22	.17	.10	.06	.05	.03
25	.41	.31	.20	.17	.10	.06	.05	.03
26	.37	.31	.20	.17	.10	.06	.05	.03
27	.35	.29	.20	.17	.10	.06	.05	.03
28	.35	.29	.22	.17	.09	.06	.05	.03
29	.....	.29	.20	.17	.09	.06	.05	.03
30	.....	.29	.18	.17	.07	.06	.05	.03
31	.....	.29	.....	.15	.....	.06	.05	.....

NOTE.—Discharge interpolated May 10, and June 15–16, as water-stage recorder was not in operation.

Monthly discharge of Haines Creek near Tujunga, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet)
	Maximum.	Minimum.	Mean.	
February 7–28	0.43	0.27	0.330	14.4
March	.39	.29	.336	20.7
April	.27	.18	.232	13.8
May	.18	.15	.167	10.3
June	.17	.07	.115	6.84
July	.10	.05	.070	4.30
August	.06	.05	.055	3.38
September	.05	.03	.042	2.50
The period				76.2

ARROYO SECO NEAR PASADENA, CALIF.

LOCATION.—Near south line of sec. 30, T. 2 N., R. 12 W. (unsurveyed), just below trail crossing at forest ranger's station, in Angeles National Forest, 1½ miles above mouth of Millard Canyon, about 3 miles above Devil's Gate, and 5½ miles northwest of Pasadena, Los Angeles County.

DRAINAGE AREA.—16.4 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 1, 1910, to September 30, 1917.

GAGE.—Gurley graph water-stage recorder, with concrete well and house, installed September 30, 1916, on right bank just upstream from staff gage. Original datum was not maintained.

DISCHARGE MEASUREMENTS.—Made from cable 115 feet below control or by wading.

CHANNEL AND CONTROL.—Bed composed of solid rock, gravel, and boulders. A concrete dam, extending to bed rock, was bullt across channel 15 feet below gage well. There is a notch in the crest 2 feet wide and 1 foot deep.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.79 feet at 3 p. m. December 24 (discharge, determined from extension of rating curve, 760 second-feet); minimum stage from water-stage recorder, 0.78 foot September 17–19 (discharge, 0.1 second-foot).

1910–1917: Maximum stage recorded, 12.5 feet February 20, 1914 (discharge, from extension of rating curve, 5,630 second-feet); minimum stage recorded (below gage), September 12–23, 1913 (estimated discharge, 0.1 second-foot).

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation changed by shifting of gravel above control. Rating curves well defined below 100 second-feet. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, except December 24 when hourly discharge was averaged. Records good.

Discharge measurements of Arroyo Seco near Pasadena, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	H. J. Tompkins	1.28	2.2	Mar. 30	H. J. Tompkins	1.86	10
Jan. 5	do	1.92	8.6	Apr. 14	J. C. Dort	1.83	6.2
20	do	2.18	26	25	H. J. Tompkins	1.77	6.0
Feb. 17	do	1.98	14	May 13	do	1.70	4.8
21	do	2.60	83	29	do	1.56	4.7
28	J. C. Dort	2.24	31	Aug. 27	do	.88	.2
Mar. 6	H. J. Tompkins	2.07	21				

Daily discharge, in second-feet, of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.1	2.1	2.2	8.5	11	33	9.5	6	4.2	0.8	0.4	0.2
2	40	2.2	2.9	8	11	30	9.5	5.5	3.7	.8	.4	.1
3	15	2.2	8	10	11	26	8	5.5	3.6	.8	.5	.1
4	6.5	2.7	6.5	9	10	22	7.5	5.5	3.6	.7	.5	.1
5	4.5	4.3	4.3	8.5	10	21	7.5	5	3.6	.7	.5	.1
6	10	3.5	3.6	8	10	20	7	5	3.4	.7	.5	.1
7	9	3.1	3.1	8	10	19	7	5	3.2	.7	.4	.2
8	6	3.0	2.9	7.5	9.5	18	7	5.5	2.9	.6	.4	.2
9	5	2.9	2.9	7.5	9	20	8	5.5	2.9	.6	.4	.2
10	8	2.8	2.8	7	9	19	8	5.5	2.7	.6	.4	.1
11	8.5	2.5	2.7	7	9	17	7.5	5.5	2.7	.5	.4	.1
12	6.5	2.6	2.7	7.5	9	16	7	5	2.6	.6	.4	.1
13	5.5	2.7	2.6	9	9	16	6.5	5	2.2	.6	.4	.1
14	4.8	2.6	2.6	8	9	16	6.5	5	2.0	.6	.5	.1
15	4.5	2.7	2.5	8	8.5	16	7	5	1.6	.7	.5	.1
16	3.6	2.7	2.5	10	8	14	8	4.9	1.4	.7	.4	.1
17	3.3	2.7	2.5	10	14	14	8	4.9	1.1	.7	.4	.1
18	3.0	2.6	2.5	12	10	13	7.5	7	1.0	.6	.4	.1
19	2.9	2.6	2.5	40	10	13	7	6	1.0	.6	.3	.1
20	2.9	2.5	2.6	30	34	12	6.5	5	1.1	.6	.3	.1
21	2.6	2.3	2.7	25	72	12	6	5	1.1	.5	.3	.2
22	2.7	2.2	2.7	21	120	12	6	5	1.1	.5	.3	.3
23	2.9	2.2	2.9	20	66	12	6	5	1.1	.5	.3	.2
24	2.9	2.2	272	18	46	11	6	5.5	1.0	.5	.3	.2
25	2.2	2.2	59	17	63	11	5.5	5.5	.9	.5	.3	.2
26	2.2	2.2	26	14	50	11	6	5	1.0	.5	.3	.2
27	2.2	2.2	12	13	40	11	6	5	1.0	.5	.3	.2
28	2.3	2.2	10	12	36	10	7	5	.9	.4	.2	.1
29	2.5	2.2	9	12	.....	10	6.5	4.7	.9	.4	.2	.1
30	2.4	2.2	9	12	.....	10	6	4.8	1.0	.4	.2	.1
31	2.2	.....	8.5	12	.....	10	.....	4.8	.....	.4	.2	.....

NOTE.—Water-stage recorder not in operation Dec. 11–14, Sept. 21 and 30; discharge interpolated.

Monthly discharge of Arroyo Seco near Pasadena, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 16.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	40	2.2	5.80	0.354	0.41	357
November	4.3	2.1	2.57	.157	.18	153
December	272	2.2	15.4	.939	1.08	947
January	40	7	12.9	.787	.91	793
February	120	8	25.5	1.55	1.61	1,420
March	33	10	16.0	.976	1.13	984
April	9.5	5.5	7.05	.430	.48	420
May	7	4.7	5.25	.320	.37	323
June	4.2	.9	2.02	.123	.14	120
July	.8	.4	.590	.036	.04	36.3
August	.5	.2	.365	.022	.03	22.4
September	.3	.1	.140	.0085	.01	8.3
The year	272	.1	7.71	.470	6.39	5,580

SANTA CLARA RIVER BASIN.

SESPE CREEK NEAR SESPE, CALIF.

LOCATION.—At Bradfields camp, in Santa Barbara National Forest, three-fourths of a mile below mouth of West Fork of Sespe Creek, 4½ miles above intake of Fillmore Canal, and about 6½ miles northwest of Sespe, Ventura County.

DRAINAGE AREA.—216 square miles (measured by Ralph Bennett, consulting engineer).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1917 (not complete).

GAGE.—Painted on large boulder and on rock cliff on left bank; read by G. H. Killgore.

DISCHARGE MEASUREMENTS.—Made from cable 250 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and large boulders; fairly permanent.

EXTREMES OF DISCHARGE. Maximum stage recorded during year, 12.0 feet February 24 (discharge, 3,830 second-feet); minimum stage recorded, 4.33 feet on several days in September (discharge, 3.6 second-feet).

1915–1917: Maximum stage recorded, 18.7 feet January 17, 1916 (discharge, 18,600 second-feet); minimum stage, 4.33 feet on several days in September, 1917 (discharge, 3.6 second-feet).

ACCURACY.—Stage-discharge relation fairly permanent. The high water on February 21 and 22, 1917, caused slight changes in the channel. Fairly well defined rating curves used October 1 to February 20; February 23 to March 13; and March 27 to September 30, 1917. Gage read to hundredths; number of readings a day not known. Daily discharge ascertained by applying gage height as reported, to rating table, except March 14–26 and September 30, when it was interpolated. Records good.

COOPERATION.—Gage-height record and nearly all discharge measurements furnished by Sespe Light & Power Co.

Discharge measurements of Sespe Creek near Sespe, Calif., in 1915–1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1917.		*Feet.*	*Sec.-ft.*
Nov. 3	G. H. Killgore	5.06	20	Feb. 21	J. F. Waggoner	7.25	416
Dec. 4	do	5.62	65	21	do	7.25	424
				22	do	9.45	901
1916.				22	do	9.45	905
Jan. 2	do	7.60	508	24	do	12.00	3,970
3	do	6.70	292	Mar. 7	do	6.08	133
4	do	8.90	1,320	13	do	5.80	108
17	do	15.90	10,100	27	do	5.47	87
17	do	18.70	17,400	Apr. 15	do	5.32	66
18	do	16.90	13,700	21	do	5.21	60
19	do	9.20	1,550	28	do	5.20	62
21	do	7.60	678	May 5	do	5.10	48
27	do	12.90	4,690	12	do	4.98	36
Mar. 10	do	6.25	218	19	do	4.96	31
Apr. 4	do	5.64	106	26	do	4.94	31
20	do	5.34	66	June 24	do	4.58	10
May 31	do	4.99	42	30	do	4.56	8.9
June 20	do	4.85	23	July 1	do	4.53	8.6
July 15	do	4.80	20	15	do	4.48	7.0
Sept. 14	F. C. Ebert	4.72	9.7	28	do	4.43	4.3
29	J. F. Waggoner	4.74	8.4	Aug. 5	do	4.41	4.6
Oct. 15	do	4.98	36	11	do	4.38	3.9
Nov. 5	do	4.86	23	19	do	4.39	4.4
Dec. 10	do	4.86	24	26	do	4.37	4.4
				Sept. 1	do	4.36	4.5
1917.				8	do	4.33	3.7
Jan. 6	do	5.59	131	15	do	4.35	3.5
28	do	5.80	110	22	do	4.34	3.8
Feb. 5	F. C. Ebert	5.49	86	29	do	4.34	3.7
12	J. F. Waggoner	5.38	68				

Daily discharge, in second-feet, of Sespe Creek near Sespe, Calif., for the years ending Sept. 30, 1916 and 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	18	18	18	46	495	275	107	50	33	20	18	16
2	18	18	18	605	442	262	106	49	33	20	18	16
3	18	18	19	560	390	250	106	48	32	20	18	16
4	18	18	111	960	360	238	106	47	31	20	18	16
5	18	19	32	184	330	390	101	46	30	23	16	16
6	18	19	27	144	315	275	96	45	29	23	16	16
7	18	19	25	110	288	250	92	44	28	21	16	16
8	18	19	23	106	288	238	87	44	28	21	16	17
9	18	19	23	850	275	225	86	44	28	21	16	17
10	18	19	23	440	262	215	86	42	26	21	16	16
11	18	19	22	205	250	205	85	41	26	21	16	16
12	18	19	22	144	250	195	116	40	25	21	16	16
13	18	19	22	119	238	185	89	40	24	21	17	16
14	18	19	32	480	225	165	84	39	24	21	17	16
15	18	19	26	228	215	165	81	39	24	20	18	16
16	18	19	24	253	205	161	76	38	24	20	18	16
17	18	19	24	8,100	195	156	75	38	23	20	18	16
18	18	19	24	11,400	185	152	74	37	23	20	18	16
19	18	19	23	2,320	185	147	70	37	23	20	16	16
20	18	20	21	1,060	175	250	67	37	24	20	17	16
21	18	20	20	615	185	195	65	36	24	19	17	16
22	18	20	20	495	165	175	64	35	26	19	18	16
23	18	19	20	390	156	161	60	34	26	18	18	16
24	18	19	20	375	147	154	60	33	26	18	16	16
25	18	18	20	360	156	147	59	34	24	18	17	16
26	18	18	20	345	205	138	56	35	23	18	18	16
27	18	18	20	6,500	1,180	132	55	34	22	18	16	16
28	18	18	20	1,360	460	125	53	33	22	18	16	16
29	18	18	20	900	300	119	52	35	21	18	16	17
30	18	18	21	705	.....	113	51	34	21	18	16	27
31	18	.....	23	595	.....	110	.....	33	.....	18	16	.....
1916–17.												
1	26	21	22	65	96	240	86	47	25	8.5	5.5	4.2
2	122	21	24	64	94	228	81	41	24	8	5.5	4.0
3	27	24	38	86	94	205	81	39	23	8	5.5	4.0
4	35	24	36	99	90	174	80	37	21	8	5.5	4.0
5	26	23	34	94	85	163	80	42	21	8	5	4.0
6	52	23	26	99	82	154	79	33	20	8	5	4.0
7	58	24	25	87	86	144	78	33	20	8	5	3.6
8	36	24	24	79	81	127	78	33	19	8	5	3.6
9	35	23	24	68	80	127	76	34	18	7.5	5	3.6
10	34	21	24	74	76	127	75	34	17	7	4.8	3.6
11	47	23	24	75	73	111	71	34	16	7	4.6	3.6
12	40	23	24	86	72	96	67	33	16	7.5	4.8	4.0
13	34	22	24	330	71	91	65	29	15	7	4.8	4.0
14	33	22	24	315	70	90	67	29	14	7	4.8	4.0
15	27	23	24	315	68	90	65	30	14	6.5	4.8	4.0
16	26	22	24	100	68	89	67	30	12	6	4.8	3.8
17	25	22	24	156	74	88	68	30	10	6	4.8	3.8
18	25	22	24	158	68	88	65	33	10	6	4.8	3.8
19	24	22	24	163	72	87	61	31	9.5	6	4.8	3.6
20	24	23	24	425	300	86	56	30	9.5	6	4.8	3.6
21	24	22	24	300	420	86	53	29	9.5	6	4.6	3.6
22	23	22	24	161	903	85	52	28	9.5	6	4.4	3.8
23	24	23	24	117	440	84	53	28	9.5	6	4.4	3.8
24	23	23	478	107	3,330	84	52	29	9.5	5.5	4.4	3.8
25	22	22	1,360	103	695	83	52	30	9	5.5	4.4	3.6
26	22	23	425	106	370	82	52	30	9	5.5	4.4	3.8
27	21	22	101	142	240	82	52	28	9	5.5	4.4	3.8
28	20	23	86	135	228	82	52	28	8.5	5.5	4.2	3.8
29	20	24	75	132	.....	86	50	28	8.5	5.5	4.2	3.8
30	21	23	63	122	.....	90	48	28	9	5	4.2	3.8
31	20	.....	63	108	.....	90	.....	26	.....	5	4.2	.....

NOTE.—No gage-height record Apr. 30 to May 6, 1916; discharge interpolated.

Monthly discharge of Sespe Creek near Sespe, Calif., for the years ending Sept. 30, 1916 and 1917.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1915–16.						
October	18	18	18.0	0.083	0.10	1,110
November	20	18	18.8	.087	.10	1,120
December	111	18	25.3	.117	.13	1,560
January	11,400	46	1,320	6.11	7.04	81,200
February	1,180	147	294	1.36	1.47	16,900
March	390	110	193	.894	1.03	11,900
April	116	51	78.8	.365	.41	4,690
May	50	33	39.4	.182	.21	2,420
June	33	21	25.8	.119	.13	1,540
July	23	18	19.8	.092	.11	1,220
August	18	16	16.9	.078	.09	1,040
September	27	16	16.5	.076	.08	982
The year	11,400	16	173	.801	10.90	126,000
1916–17.						
October	122	20	32.1	0.149	0.17	1,970
November	24	21	22.6	.105	.12	1,340
December	1,360	22	105	.486	.56	6,460
January	425	64	144	.667	.77	8,850
February	3,830	68	319	1.48	1.54	17,700
March	240	82	114	.528	.61	7,010
April	86	48	65.4	.303	.34	3,890
May	47	26	32.1	.149	.17	1,970
June	25	8.5	14.2	.066	.07	845
July	8.5	5	6.61	.031	.04	406
August	5.5	4.2	4.75	.022	.03	292
September	4.2	3.6	3.81	.018	.02	227
The year	3,830	3.6	70.4	.326	4.44	51,000

CARPINTERIA CREEK BASIN.

GOBERNADOR CREEK NEAR CARPINTERIA, CALIF.

LOCATION.—In SW. ¼ SW. ¼ sec. 14, T. 4 N., R. 25 W., 3½ miles northeast of Carpinteria, Santa Barbara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 24, 1916, to September 30, 1917 (not complete).

GAGE.—Vertical staff in two sections on left bank; read by K. C. Lillingston. A temporary gage was used June 24 to September 11, 1916, with its datum 1.11 feet lower.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifts. Banks high, clean, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage from high-water mark, 3.5 feet February 21 (discharge, 200 second-feet); minimum stage recorded, 1.29 feet November 4, 29, and 30 (discharge, 0.9 second-foot).

1916–17: Maximum stage recorded, 3.5 feet February 21, 1917 (discharge, 200 second-feet); minimum stage, 1.26 feet August 31, 1916 (discharge, 0.8 seccond-foot).

DIVERSIONS.—None above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed about January 2. Rating curve used October 1 to January 2, fairly well defined; curve used January 3 to September 30, well defined. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record and some discharge measurements furnished by K. C. Lillingston.

Discharge measurements of Gobernador Creek near Carpinteria, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 29	K. C. Lillingston	1.29	0.9	Feb. 20	K. C. Lillingston	2.75	110
29	F. C. Ebert	1.29	.9	22	do	2.42	81
Dec. 25	K. C. Lillingston	1.51	6.4	27	F. C. Ebert	1.73	23
Jan. 4	do	1.42	5.8	Mar. 6	K. C. Lillingston	1.50	9.1
6	F. C. Ebert	1.37	4.9	June 28	F. C. Ebert	1.26	1.4
Feb. 8	do	1.27	2.2				

Daily discharge, in second-feet, of Gobernador Creek near Carpinteria, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1						14		3.1				
2	5	1.0					4.6			1.8	1.8	
3	3.6											
4		.9		6			4.3			1.8	1.8	
5						10		2.5				
6				4.6		9						
7					2.3		4.3					
8		1.0	1.6	3.7	2.0			2.5	1.5		1.8	1.5
9				3.1								
10	13											
11							4.0			1.8		
12												
13		1.2	1.6							1.8		
14				2.5							1.8	
15					1.8						1.8	1.5
16	1.2		1.3			6.5		2.0	1.1			
17												
18									1.5		1.8	
19			1.3									
20	1.2	1.0			112					1.6		
21			1.6				3.7					
22	1.0				80	5.5						1.5
23			1.6						1.8		1.5	
24					19	5.5					1.5	
25			6	3.1							1.5	
26								1.8				
27	1.2				23		3.1			1.6		
28					18	4.9		1.6	1.8			
29		.9							1.8		1.5	
30	1.0	.9		2.8		4.9	3.1					
31											1.5	

NOTE.—Maximum stage on Jan. 3, 2.11 feet (discharge, 52 second-feet).

SANTA YNEZ RIVER BASIN.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CALIF.

LOCATION.—About on line between secs. 10 and 11, T. 5 N., R. 27 W., at Gibraltar dam site, just above mouth of Devil Canyon Creek, and 7 miles north of Santa Barbara, Santa Barbara County. Mono Creek enters 3¼ miles above station.

DRAINAGE AREA.—218 square miles at site 900 feet downstream from gage used since August 2, 1916 (measured on topographic maps).

RECORDS AVAILABLE.—November 1, 1903, to April 30, 1907; October 1, 1907, to January 31, 1908; February 6, 1910, to September 30, 1917, Station was maintained about 4¾ miles above present site January 1 to June 20, 1903.

GAGE.—Friez water-stage recorder installed August 2, 1916, on left bank at portal of tunnel 50 feet above base of Gibraltar dam. Previous gage was a staff in three sections about 900 feet below north portal of the Santa Barbara water-supply tunnel. April 13, 1911, gage datum was lowered 5.00 feet.

DISCHARGE MEASUREMENTS.—Made from cable at old gage or by wading at various sections.

CHANNEL AND CONTROL.—Sand and gravel; shifts greatly during extreme high water; relatively permanent at low water. Control, which is base of Gibraltar dam, is satisfactory except for periods when flash boards and sand bags are placed on crest.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.8 feet at 5 p. m. December 24 (discharge, from extension of rating curve, 10,900 second-feet); minimum discharge, 0.2 second-foot September 15–30.

1904–1917: Maximum stage recorded, 23.0 feet at 8 p. m. January 25, 1914 (discharge, 13,100 second-feet); no flow during most of July to September 1904.

DIVERSIONS.—City of Santa Barbara diverts water at gage for municipal use. The record includes this diversion. Practically all water in river was being diverted from July 14 to September 30.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent December 24 to May 29. During remainder of year flash boards and sand bags were in use on crest of dam and changes were frequently made. Two rating curves, fairly well defined to 3,500 second-feet, were used December 24 to May 29; daily discharges for this period ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Discharge October 1 to December 23 estimated from discharge measurements and precipitation records; discharge May 30 to July 14 interpolated between discharge measurements; July 15 to September 30, discharge from weir record of diversion, corrected for leakage. Records October 1 to December 23, roughly approximate; remainder of record good.

COOPERATION.—Gage-height record and most of discharge measurements furnished by city of Santa Barbara.

Discharge measurements of Santa Ynez River near Santa Barbara, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	Elmer Gilchrest	2.48	18	Mar. 16	Elmer Gilchrest	2.75	92
4	.....do	2.34	4.9	22	.....do	2.66	82
11	.....do	2.44	14	23	.....do	2.70	109
13	.....do	2.38	6.2	Apr. 4	.....do	2.62	62
17	.....do	2.37	5.0	7	.....do	2.60	50
Nov. 28	Ebert and Gilchrest	2.68	7.4	10	.....do	2.60	52
Dec. 4	Elmer Gilchrest	2.66	26	13	.....do	2.58	47
17	.....do	2.46	9.0	16	.....do	2.61	51
30	.....do	2.70	62	25	.....do	2.55	33
Jan. 2	.....do	2.82	122	28	.....do	2.55	34
5	.....do	2.85	137	May 3	.....do	2.53	31
5	F. C. Ebert	2.84	119	7	.....do	2.50	27
9	Elmer Gilchrest	2.66	74	11	.....do	2.50	27
13	O. Packard	.....	215	17	.....do	2.44	21
23	.....do	2.74	107	21	.....do	2.46	21
27	.....do	2.68	86	26	.....do	2.48	21
Feb. 3	.....do	2.60	59	29	.....do	2.44	19
7	F. C. Ebert	2.58	49	June 5	.....do	2.40	15
22	Elmer Gilchrest	4.27	1,320	9	.....do	2.38	11
25	.....do	5.11	2,500	13	.....do	2.38	9.9
28	F. C. Ebert	3.36	393	15	.....do	2.36	8.2
Mar. 1	.....do	3.28	355	20	.....do	2.80	3.7
5	Gilchrest and Trace	2.98	198	23	.....do	2.85	3.7
8	Elmer Gilchrest	2.90	177	27	F. C. Ebert	.....	2.6
14	.....do	2.80	114	July 14	Elmer Gilchrest	2.64	1.5

Daily discharge, in second-feet, of Santa Ynez River near Santa Barbara, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	.....	15	147	65	329	64	32	15	1.9	0.9	0.4
2	18	.....	60	122	62	278	62	32	15	1.9	.8	.4
3	12	.....	30	215	62	240	59	32	15	1.8	.8	.3
4	5	.....	26	173	57	225	56	32	15	1.8	.7	.3
5	7	.....	15	126	53	200	56	29	15	1.8	.7	.3
6	6	.....	10	107	49	186	56	27	14	1.7	.7	.3
7	5	.....	10	93	45	173	50	27	13	1.7	.6	.3
8	5	.....	10	76	43	160	50	27	12	1.7	.5	.3
9	10	.....	10	74	43	164	50	27	11	1.6	.5	.3
10	25	.....	10	71	43	147	48	27	11	1.6	.5	.3
11	14	.....	9	71	43	134	45	27	10	1.6	.5	.3
12	10	.....	9	95	43	126	45	26	10	1.5	.5	.3
13	6	.....	9	215	43	118	43	24	10	1.5	.5	.3
14	6	.....	9	96	41	114	43	23	9	1.5	.6	.3
15	6	.....	9	83	41	107	45	20	8	1.4	.5	.2
16	5	.....	9	77	38	100	50	18	7	1.3	.5	.2
17	5	.....	9	62	38	93	45	18	6	1.2	.5	.2
18	5	.....	9	77	38	93	45	21	5	1.1	.5	.2
19	4	.....	9	194	45	93	45	21	4.0	1.1	.5	.2
20	4	.....	9	198	486	93	45	21	3.7	.9	.5	.2
21	4	.....	9	149	981	90	41	21	3.7	1.1	.6	.2
22	4	.....	9	128	1,720	87	41	18	3.7	1.0	.5	.2
23	4	.....	30	110	524	84	38	21	3.7	1.0	.5	.2
24	4	.....	2,500	99	472	81	38	23	3.4	1.0	.5	.2
25	4	.....	375	92	1,730	78	38	23	3.1	1.0	.5	.2
26	3	.....	150	86	712	75	36	24	2.8	.9	.5	.2
27	3	.....	104	86	486	72	38	20	2.6	.9	.5	.2
28	3	7.5	93	80	398	70	38	21	2.4	1.0	.5	.2
29	3	.....	100	77	.....	70	36	18	2.2	1.0	.4	.2
30	3	.....	76	74	.....	67	34	17	2.0	1.0	.4	.2
31	3	.....	73	68	.....	67	.....	16	.....	.8	.4	.....

NOTE.—Water-stage recorder not in operation Dec. 25-26 (discharge estimated) and Mar. 21-27 (discharge interpolated).

Monthly discharge of Santa Ynez River near Santa Barbara, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum	Mean.	
October	25	3	6.5	400
November	.....	.....	a 6.0	357
December	2,500	9	123	7,560
January	215	62	110	6,760
February	1,730	38	300	16,700
March	329	67	129	7,930
April	64	34	46.0	2,740
May	32	16	23.6	1,450
June	15	2.0	7.94	472
July	1.9	.8	1.33	81.8
August	.9	.4	.55	33.8
September	.4	.2	.25	14.9
The year	2,500	.2	61.5	44,500

a Estimated.

SANTA YNEZ RIVER NEAR LOMPOC, CALIF.

LOCATION.—At highway bridge near east boundary of La Misión Vieja de la Purísima grant, 1½ miles east of Lompoc, Santa Barbara County.

DRAINAGE AREA.—725 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 10, 1906, to January 9, 1907; September 25, 1907, to September 30, 1917 (except 1909).

GAGE.—Vertical staff fastened to pier at right end of center span of bridge near downstream end; read by Donald McDonald. Datum lowered 1.00 foot June 27, 1917.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Sand; shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.20 feet at 7.10 a. m., February 22 (discharge, 5,500 second-feet); minimum discharge, 18 second-feet, September 25–30.

1906–1917: Maximum stage recorded, 13.0 feet, January 25, 1914 (discharge, 41,800 second-feet); minimum discharge, 5 second-feet, October 13–21, 1913.

DIVERSIONS.—Except for a small amount diverted by the city of Santa Barbara at Gibraltar dam, water is not diverted above the station, but there is some pumping from wells along the banks of the river for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Fairly well defined rating curves were used December 3–23, December 27 to January 30, January 31 to March 8, and March 17 to April 26. Gage read once a day to hundredths during low stages and to half-tenths at other times. Daily discharge ascertained by applying gage height to rating table for periods when tables were applicable; December 24–26 computed from a comparison with records for Santa Barbara as gage heights do not appear to represent mean for these days. Remainder of record interpolated between discharge measurements and by comparisons with Santa Barbara record. Records fair.

Discharge measurements of Santa Ynez River near Lompoc, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	Donald McDonald	0.45	37	Apr. 9	Donald McDonald	0.75	195
23	do	.40	56	23	do	.75	169
Nov. 6	do	.45	38	30	F. C. Ebert	.65	108
21	do	.45	40	May 7	Donald McDonald	.65	116
Dec. 4	do	.50	60	21	do	.60	83
18	do	.45	46	June 4	do	.60	71
Jan. 8	do	1.00	329	22	do	.60	37
22	do	1.10	387	26	F. C. Ebert	1.61	27
Feb. 5	do	.75	192	July 9	Donald McDonald	1.62	25
22	do	3.10	5,140	Aug. 20	do	1.50	22
Mar. 5	do	1.10	603	Sept. 10	do	1.56	19
20	do	.95	321				

Daily discharge, in second-feet, of Santa Ynez River near Lompoc, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	44	40	250	285	710	220	109	73	26	23	20
2	75	43	40	320	285	710	220	110	72	26	23	20
3	60	41	140	400	220	600	192	111	71	26	23	20
4	50	40	60	490	220	600	192	112	71	26	23	20
5	50	39	60	320	192	600	192	113	69	26	23	20
6	75	38	60	320	192	600	192	114	65	25	23	20
7	50	38	60	250	192	550	192	116	63	25	23	19
8	40	38	60	320	192	550	192	113	61	25	23	19
9	37	38	60	320	192	525	192	111	59	25	23	19
10	75	38	60	320	192	500	192	108	58	25	23	19
11	70	39	48	320	192	475	192	106	56	25	23	19
12	68	39	48	400	192	450	192	104	54	25	23	19
13	66	39	48	500	192	425	192	101	52	25	22	19
14	65	39	48	250	192	400	192	99	50	25	22	19
15	64	39	48	250	192	375	192	97	48	25	22	19
16	63	40	48	250	192	350	190	94	47	24	22	19
17	62	40	48	250	192	320	190	92	45	24	22	19
18	61	40	48	250	192	320	190	90	43	24	22	19
19	60	40	48	400	192	320	190	87	41	24	22	19
20	59	40	48	600	435	320	190	85	39	24	22	19
21	58	40	48	490	1,610	320	165	83	38	24	22	19
22	57	40	48	400	5,500	320	165	82	37	24	22	19
23	56	40	48	320	1,920	285	165	81	34	24	22	19
24	54	40	1,000	320	1,220	285	165	80	32	24	21	19
25	53	40	4,500	320	4,480	285	140	79	30	24	21	18
26	52	40	750	320	2,140	285	140	78	27	24	21	18
27	50	40	190	320	950	285	132	77	27	24	21	18
28	49	40	140	360	830	285	124	76	27	24	21	18
29	48	40	140	360	.....	252	116	76	27	23	21	18
30	46	40	140	320	.....	252	108	75	27	23	21	18
31	45	.....	140	285	.....	220	.....	74	.....	23	20	.....

NOTE.—Gage not read Oct. 12, Jan. 11–13, Mar. 9–16, Apr. 27–29, and July 19 to Aug. 16; discharge interpolated, except Jan. 11–13, for which it was estimated.

Monthly discharge of Santa Ynez River at Lompoc, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 725 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	75	37	57.0	0.079	0.09	3,500
November	44	38	39.7	.055	.06	2,360
December	4,500	40	267	.368	.42	16,400
January	600	250	342	.472	.54	21,000
February	5,500	192	821	1.13	1.18	45,600
March	710	220	412	.568	.65	25,300
April	220	108	177	.244	.27	10,500
May	116	74	94.6	.130	.15	5,820
June	73	27	48.1	.063	.07	2,860
July	26	23	24.5	.034	.04	1,510
August	23	20	22.1	.030	.03	1,360
September	20	18	19.0	.026	.03	1,130
The year	5,500	18	190	.262	3.53	137,000

MISSION TUNNEL NEAR SANTA BARBARA, CALIF.

Mission tunnel, which is a part of the Santa Barbara water supply system, extends through the Santa Ynez Mountains to Santa Ynez River. The length is 19,540 feet and the approximate cross section, outside of lining, is 7 by 8 feet. The Santa Ynez River (north) portal is in the NE. ¼ NE. ¼ sec. 15 and the Mission Canyon portal near the east quarter corner of sec. 33, T. 5 N., R. 27 W. When the Gibraltar reservoir (under construction) is completed the water from Santa Ynez River will be diverted for municipal use at Santa Barbara. The seepage into this tunnel, which is given in the following table, is measured over a weir in a sand box just before it enters the water main. When water is diverted from Santa Ynez River into tunnel it is measured over a weir at North Portal, and this amount is deducted from weir record at South Portal.

Seepage, in second-feet, into Mission tunnel near Santa Barbara, Calif., for 1912-1917.

Day.	1912	1913	1914	1915	1916	1917
Jan. 1	.....	.....	3.76	4.18	3.62	3.46
Feb. 1	5.18	5.56	4.90	4.18	5.18	3.70
Mar. 1	4.28	6.16	6.42	5.18	5.66	4.78
Apr. 1	3.90	5.06	5.16	5.18	5.06	4.38
May 1	3.90	5.02	5.30	5.00	4.66	3.94
June 1	.....	5.00	5.46	4.92	4.38	3.70
July 1	.....	4.76	5.46	4.72	4.40	3.78
Aug. 1	.....	4.40	5.32	4.38	4.24	3.50
Sept. 1	.....	4.20	5.02	4.28	4.18	3.54
Oct. 1	.....	3.88	4.62	4.16	3.96	.....
Nov. 1	.....	3.88	4.36	3.94	3.72	.....
Dec. 1	.....	3.88	4.14	3.62	3.72	.....

SALINAS RIVER BASIN.

ARROYO SECO NEAR SOLEDAD, CALIF.

LOCATION.—In sec. 21, T. 19 S., R. 6 E., at Pettitt's ranch, about 15 miles south of Soledad, Monterey County.

DRAINAGE AREA.—215 square miles.

RECORDS AVAILABLE.—January 1, 1901, to September 30, 1917.

GAGE.—Staff in two sections on right bank; lower section fastened to an alder tree 400 feet above cable, upper section fastened to sycamore about 100 feet downstream. Lower section washed out February 5, 1915; replaced in two sections at same location and datum as previous section. Gage read by Mrs. Charles Pettitt.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage, or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock outcrop; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.5 feet at 4.30 p. m. February 21 (discharge, from extension of rating curve, 22,000 second-feet); minimum stage recorded, 2.04 feet August 19 to September 24 (discharge, 5 second-feet).

1901–1917: Maximum stage recorded, 15.5 feet at 4.30 p. m. February 21, 1917. (discharge, from extension of rating curve, 22,000 second-feet); stage 20.5 feet, January 25, 1914, gave discharge, 17,500 second-feet. Stream dry during periods in 1902–1904, 1906, 1908, 1913, and 1914.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low water changed during flood of February 21. Rating curves for year fairly well defined below 10,000 second-feet. Gage read to hundredths once a day with more frequent readings during floods. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Arroyo Seco near Soledad, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	Charles Pettitt	2.60	25	Mar. 18	Charles Pettitt	3.68	254
Jan. 1	do	3.30	188	26	do	3.36	207
Feb. 3	do	2.68	72	Apr. 2	do	3.20	173
20	do	7.65	3,200	22	do	2.96	116
23	do	6.70	1,990	30	do	2.86	92
25	do	10.05	7,450	May 1	McGlashan and Ebert	2.84	83
26	do	7.20	2,550	Aug. 3	Charles Pettitt	2.14	8.4
Mar. 6	do	4.20	507				

Daily discharge, in second-feet, of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	38	42	50	190	62	1,060	172	91	60	17	7	5
2	38	42	74	190	58	840	168	91	60	17	9	5
3	35	42	535	450	54	730	168	91	57	17	9	5
4	31	42	318	238	54	580	164	91	54	17	8	5
5	22	58	190	214	54	535	159	91	51	17	7	5
6	11	54	172	214	54	450	155	87	48	15	6.5	5
7	11	54	146	202	50	414	150	84	46	14	6.5	5
8	11	50	90	168	50	380	146	84	46	12	6.5	5
9	10	46	82	146	50	380	124	81	43	12	6.5	5
10	10	46	78	142	50	414	142	78	38	12	6.5	5
11	50	42	70	133	50	380	142	78	38	7	6	5
12	46	42	70	137	70	348	146	75	38	7	6	5
13	38	42	66	124	62	364	133	72	36	7	6	5
14	38	42	62	120	58	348	128	72	36	7	6	5
15	38	42	58	111	54	318	128	69	33	7	6	5
16	38	42	58	102	50	304	133	66	31	6.5	6	5
17	38	42	58	94	50	304	133	69	29	6.5	6	5
18	35	42	54	94	50	290	128	75	27	6.5	6	5
19	35	42	54	90	50	263	128	72	27	6.5	5	5
20	38	38	50	86	3,600	263	124	69	25	6	5	5
21	38	38	50	82	11,300	238	118	66	25	6	5	5
22	42	38	50	78	6,390	228	116	66	24	6	5	5
23	42	38	58	74	2,300	224	111	66	24	6	5	5
24	42	38	8,960	74	9,380	219	103	63	24	6	5	5
25	42	38	785	70	10,200	204	103	63	22	6	5	6
26	38	38	758	66	3,120	200	100	63	22	6	5	6
27	38	38	580	66	1,720	195	94	63	22	6	5	6
28	42	38	535	82	1,420	195	94	63	20	6	5	6.5
29	42	42	512	74	.....	190	94	63	20	6	5	6.5
30	42	42	490	70	.....	186	91	63	20	6	5	6.5
31	42	.....	490	66	.....	177	.....	63	.....	6.5	5	.....

Monthly discharge of Arroyo Seco near Soledad, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	50	10	34.2	0.159	0.18	2,100
November	58	38	42.7	.199	.22	2,540
December	8,960	50	503	2.34	2.70	30,900
January	450	66	131	.609	.70	8,050
February	11,300	50	1,800	8.37	8.72	100,000
March	1,060	177	362	1.68	1.94	22,300
April	172	91	130	.605	.68	7,740
May	91	63	73.8	.343	.40	4,540
June	60	20	34.9	.162	.18	2,080
July	17	6	9.15	.043	.05	563
August	9	5	5.98	.028	.03	368
September	6.5	5	5.25	.024	.03	312
The year	11,300	5	251	1.17	15.83	181,000

COYOTE RIVER BASIN.

COYOTE RIVER NEAR MADRONE, CALIF.

LOCATION.—In northwest corner San Jose grant, above highway bridge at mouth of canyon, a quarter of a mile below mouth of Las Animas Creek, and 2¾ miles northeast of Madrone, Santa Clara County.

DRAINAGE AREA.—193 square miles (reported by Duryea, Haehl, and Gilman).

RECORDS AVAILABLE.—October 1, 1902, to September 30, 1912; December 8, 1916, to September 30, 1917.

GAGE.—Inclined staff in three sections on left bank about 1,000 feet above highway bridge, read by Mrs. A. Rosa; 1902–1912 gage was at highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, boulders and solid rock. Banks high. One channel at all stages. Control is boulders and solid rock; permanent. Stage of zero flow about gage height 1.6 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined from high-water mark on gage, 14.5 feet about 3 p. m. February 21 (discharge, 10,100 second-feet); minimum stage, 1.95 feet September 25–30 (discharge, 0.6 second-foot).

1902–1912: Maximum discharge recorded, probably March 7, 1911 (discharge, 25,000 second-feet); minimum discharge not known as record is incomplete.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined throughout. Gage read usually to hundredths twice daily with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table except at high stages for which they were computed from hydrographs. Records good.

Discharge measurements of Coyote River near Madrone, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 8	W. O. Clark		11	Feb. 21	Charles Leidl	11.78	a5,980
9	do		11	21	do	12.47	a7,390
10	do		9.4	21	do	13.50	a8,700
11	do		9.5	22	do	10.10	3,960
12	do		9.0	23	do	7.02	1,050
14	do		8.0	27	W. O. Clark	6.20	629
14	do		8.6	28	do	5.72	454
15	Charles Leidl	2.60	8.8	Mar. 2	do	5.19	256
Jan. 3	W. O. Clark	6.72	1,010	5	do	4.49	156
4	do	5.30	277	8	do	4.20	108
9	Charles Leidl	3.62	54	18	do	4.01	94
9	W. O. Clark	3.62	53	28	do	3.64	60
Feb. 19	Charles Leidl	3.07	26	Apr. 28	do	3.10	24
20	do	5.04	241	May 2	H. D. McGlashan	3.08	21
20	do	6.99	993	June 11	W. O. Clark	2.69	11
20	do	7.93	1,600	25	H. D. McGlashan	2.52	7.1
20	do	7.98	1,620	Aug. 14	J. F. Kunesh	2.09	1.7

a Float measurement.

Daily discharge, in second-feet, of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	123	18	285	90	28	12	4.4	1.2	1.2
2	.....	389	18	238	90	28	12	4.4	2.0	1.2
3	.....	1,490	18	188	80	23	12	3.1	2.0	1.2
4	.....	270	18	171	70	23	12	3.1	2.0	1.2
5	.....	179	18	156	62	23	12	3.1	1.2	1.2
6	.....	129	17	149	43	23	12	3.1	1.2	1.2
7	.....	90	17	149	43	23	11	4.4	1.2	1.2
8	11	66	16	149	37	19	11	4.4	1.6	1.2
9	11	54	16	208	37	19	11	4.4	1.6	2.0
10	9.5	48	17	149	32	15	7.5	3.1	1.6	2.0
11	9.5	41	18	135	32	15	7.5	3.1	1.6	2.0
12	9	36	18	123	32	15	7.5	3.1	2.0	2.0
13	9	111	18	100	37	15	6	3.1	2.0	1.2
14	8.5	48	16	123	37	15	6	3.1	2.0	1.2
15	9	36	15	111	43	15	6	3.1	2.0	1.2
16	8.5	30	14	100	37	15	6	3.1	2.0	1.2
17	8	28	14	90	40	15	6	3.1	2.0	1.2
18	7	26	14	85	37	17	6	2.0	2.0	1.2
19	7	24	21	80	37	17	6	2.0	1.2	1.2
20	7	26	864	70	34	15	6	2.0	1.2	1.2
21	7	26	5,390	70	32	15	4.4	2.0	1.2	1.2
22	7	24	4,310	70	32	15	4.4	2.0	1.2	1.2
23	110	21	1,120	66	32	15	4.4	2.0	1.2	1.2
24	2,050	21	3,820	62	32	15	4.4	2.0	1.2	1.2
25	475	21	3,550	62	28	15	4.4	1.2	1.2	.6
26	123	21	1,150	62	28	15	4.4	1.2	2.0	.6
27	90	21	659	62	28	15	3.1	1.2	2.0	.6
28	111	18	473	62	23	15	3.1	1.2	2.0	.6
29	135	18	.....	58	28	15	3.1	1.2	2.0	.6
30	100	18	.....	62	28	15	3.1	1.2	1.2	.6
31	80	18	.....	54	.....	14	.....	1.2	1.2	.....

NOTE.—Discharge Dec. 8–14 estimated from discharge measurements. Gage not read Dec. 16; discharge interpolated. Discharge Dec. 23–26, Jan. 2–4, and Feb. 20–27 determined from hydrograph.

Monthly discharge of Coyote River near Madrone, Calif., for the year ending Sept. 30, 1917.

[Drainage area 193 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
December 8–31	2,050	7	142	0.736	0.66	6,760
January	1,490	18	112	.580	.67	6,890
February	5,390	14	773	4.01	4.18	42,900
March	285	54	114	.591	.68	7,010
April	90	23	41.4	.215	.24	2,460
May	28	14	17.5	.091	.10	1,080
June	12	3.1	7.14	.037	.04	425
July	4.4	1.2	2.63	.014	.02	162
August	2.0	1.2	1.61	.0083	.01	99
September	2.0	.6	1.19	.0062	.007	71
The period	.....	.....	.....	.....	.....	67,900

COYOTE RIVER AT COYOTE, CALIF.

LOCATION.—Near north end La Laguna Seca grant, about a quarter of a mile above ford, and 1,000 feet east of Coyote post office, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Vertical staff in two sections fastened to sycamore trees on left bank 1,000 feet east of post office at Coyote; read by Vera G. Heple.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water. One channel at all stages; clean and straight for several hundred feet above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.2 feet at 5.30 p. m. February 21 (discharge, 9,900 second-feet); stream dry October 1 to December 22 and May 6 to September 30.

DIVERSIONS.—None. Some water is pumped from wells along the river above Coyote.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used December 23 to February 20, fairly well defined; two well-defined rating curves used for remainder of year. Gage read to quarter tenths twice daily with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table except December 23–25, January 2–4; and February 20–27 when they were computed from hydrographs. Records December 23 to February 20, fair; remainder of record good.

Discharge measurements of Coyote River at Coyote, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 3	W. O. Clark	9.05	895	Feb. 23	Charles Leidl	10.14	1,140
5	do	7.15	124	27	W. O. Clark	8.88	586
9	Charles Leidl	6.20	16	Mar. 5	do	7.60	139
9	W. O. Clark	6.20	16	8	do	7.37	84
Feb. 19	do		Dry.	18	do	7.25	57
21	Charles Leidl	14.82	8,420	28	do	7.00	26
21	Clark and Leidl	14.95	9,260	Apr. 28	do	6.45	0.8
22	Charles Leidl	13.60	5,190	May 2	F. C. Ebert	6.39	a 0.5

a Estimated.

Daily discharge, in second-feet, of Coyote River at Coyote, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1		59	0.0	280	17	0.5	16		2.9	0.9	69	6.5	
2		97	.0	204	17	.4	17		2.9	.9	69	6.5	
3		1,410	.0	189	17	.2	18		2.9	.0	52	3.5	
4		359	.0	149	14	.2	19		2.9	.0	52	3.5	
5		125	.0	124	11	.2	20		2.9	643	52	1.1	
6		72	.0	111	11		21		4.0	5,090	52	3.5	
7		38	.0	89	11		22		2.9	4,470	45	1.1	
8		24	.9	79	6.5		23	16	2.9	1,160	38	1.1	
9		16	1.8	124	6.5		24	1,320	2.9	2,220	38	1.1	
10		7	1.8	124	6.5		25	216	1.8	4,040	26	1.1	
11		4.0	.0	100	3.5		26	53	1.8	1,310	26	1.1	
12		2.9	.9	89	3.5		27	21	2.9	638	26	.5	
13		7	1.8	79	6.5		28	24	5.5	465	26	.5	
14		7	.9	89	6.5		29	59	2.9		26	.5	
15		2.9	.0	89	6.5		30	30	1.8		22	.4	
							31	17	1.8		17		

Monthly discharge of Coyote River at Coyote, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet)
	Maximum.	Minimum.	Mean.	
December	1,320	0.0	56.6	3,480
January	1,410	1.8	73.4	4,510
February	5,090	.0	716	39,800
March	280	17	82.4	5,070
April	17	.4	5.87	349
May	.5	.0	.048	3.0
The year	5,090	.0	73.5	53,200

NOTE.—No flow Oct. 1 to Dec. 22 and May 6 to Sept. 30.

COYOTE RIVER NEAR EDENVALE, CALIF.

LOCATION.—At east boundary Santa Teresa grant at "The Narrows," 1½ miles northeast of Edenvale, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Inclined staff in two sections fastened to solid rock on left bank at "The Narrows"; read by Mrs. J. H. Swickard.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage, or by wading.

CHANNEL AND CONTROL.—Bed composed of fine gravel overlying solid rock; not permanent. Channel is clean and straight for several hundred feet above and below gage. Left bank, high; right bank not likely to be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.2 feet at 6.10 p. m. February 21 (discharge, 8,590 second-feet); stream dry October 1 to December 23 and June 30 to September 30.

DIVERSIONS.—None. Water is pumped from wells along the river above station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used December and January, fairly well defined; February to June, well defined. Gage read to quarter-tenths twice daily; additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table, except December 24–25, January 2–4, and February 20–27, for which it was computed from hydrograph. Records December 24 to January 11, fair; remainder of record, good.

Discharge measurements of Coyote River near Edenvale, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 4	W. O. Clark	4.10	117	28	W. O. Clark	4.81	469
9	do	3.34	11	Mar. 5	do	3.91	122
9	Charles Leidl	3.34	13	8	do	3.73	81
Feb. 19	W. O. Clark	2.90	Dry.	18	do	3.61	66
21	Charles Leidl	12.05	a 8,370	28	do	3.43	31
22	do	10.05	5,480	Apr. 28	do	3.22	6.4
23	do	6.21	1,320	May 2	F. C. Ebert	3.20	4.9
27	W. O. Clark	5.40	780				

a Float measurement.

Daily discharge, in second-feet, of Coyote River near Edenvale, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	64	.....	338	28	5.5	2.0
2	.....	103	.....	247	23	4.9	1.7
3	.....	1,100	.....	182	23	4.3	1.7
4	.....	300	.....	147	23	4.3	1.8
5	.....	139	.....	124	23	4.3	1.8
6	.....	89	.....	100	23	4.3	2.0
7	.....	52	.....	86	23	4.3	2.0
8	.....	25	.....	78	23	4.3	2.0
9	.....	11	.....	96	22	3.7	2.0
10	.....	3.4	.....	124	19	3.4	2.0
11	.....	.4	.....	100	13	2.9	2.0
12	.....	.....	.....	80	11	2.9	2.0
13	.....	.....	.....	65	11	2.3	2.0
14	.....	.....	.....	88	11	1.8	1.7
15	.....	.....	.....	84	11	1.6	1.6
16	.....	.....	.....	69	11	1.7	1.6
17	.....	.....	.....	65	11	2.0	1.2
18	.....	.....	.....	58	11	2.3	1.2
19	.....	.....	.....	56	11	2.9	1.2
20	.....	.....	378	51	9	2.9	1.2
21	.....	.....	3,890	47	8.5	2.9	1.0
22	.....	.....	4,570	46	7	2.9	.6
23	.....	.....	1,300	39	7	2.9	.6
24	902	.....	2,100	39	7	2.9	.4
25	208	.....	4,500	34	7	2.9	.4
26	49	.....	1,540	31	7	2.9	.4
27	13	.....	778	31	7	2.9	.4
28	1.7	.....	480	31	6.5	2.9	.2
29	49	.....	.....	31	5.5	2.9	.2
30	36	.....	.....	31	5.5	2.6	.....
31	18	.....	.....	31	.....	2.3	.....

NOTE.—No flow on days for which discharge is not given.

Monthly discharge of Coyote River near Edenvale, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
December	902	0.0	41.2	2,530
January	1,100	.0	60.9	3,740
February	4,570	.0	698	38,800
March	338	31	84.8	5,210
April	28	5.5	13.6	809
May	5.5	1.6	3.15	194
June	2.0	.0	1.30	77
The year	4,570	.0	70.9	51,400

NOTE.—No flow Oct. 1 to Nov. 30 and July 1 to Sept. 30.

COYOTE RIVER AT SAN JOSE, CALIF.

LOCATION.—At Julian Street Bridge in San Jose, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1916, to September 30, 1917, when station was discontinued.

GAGE.—Chain gage fastened to downstream guard rail of Julian Street Bridge. A temporary vertical staff fastened to a willow tree on left bank 60 feet below bridge was used December 20, 1916, to January 8, 1917; datum same as for chain gage. Gage read by S. F. Bullard.

DISCHARGE MEASUREMENTS.—Made from Julian Street Bridge, or by wading just above bridge.

CHANNEL AND CONTROL.—Gravel and clay; fairly permanent. Channel clean and practically straight for several hundred feet above and below gage. Banks steep and covered with brush; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined from high-water marks, about 22.0 feet at 11 p. m. February 21 (discharge, 8,530 second-feet); stream dry June 21 to September 30.

DIVERSIONS.—None, but water for irrigation is pumped from wells along river above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 2,500 second-feet and fairly well defined to maximum stage. Gage read to half-tenths twice a day, with additional readings during high water. Daily discharge ascertained by applying mean daily gage height to rating table, except December 23–25; January 2–4; February 20–27, when they were computed from hydrograph. Records good.

Discharge measurements of Coyote River at San Jose, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 9	W. O. Clark	4.56	14	Mar. 2	W. O. Clark	6.51	266
9	Charles Leidl	4.56	17	5	.....do	5.77	143
Feb. 22	.....do	17.90	5,720	18	.....do	5.20	63
22	.....do	16.51	4,410	28	.....do	4.65	28
23	.....do	11.28	1,630	Apr. 28	.....do	4.33	6.2
23	.....do	10.08	1,320	May 2	H. D. McGlashan	4.30	4.9
27	.....do	8.46	756	June 25	.....do	4.00	[a] Dry.

[a] Water standing in pools.

Daily discharge, in second-feet, of Coyote River at San Jose, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	35	0.2	381	20	3.8	1.0
2	.....	78	.2	247	20	3.8	1.0
3	.....	1,330	.2	182	20	3.8	1.0
4	.....	389	.....	140	20	2.5	.5
5	.....	156	.....	98	19	2.5	.5
6	.....	91	.....	75	15	2.5	.5
7	.....	42	.....	75	12	2.5	.5
8	.....	30	.....	75	14	2.5	.5
9	.....	22	.....	77	14	2.5	.5
10	.....	17	.....	84	12	2.5	.5
11	.....	12	.....	111	11	2.2	.5
12	.....	12	.....	75	10	1.8	.5
13	.....	9.5	.....	70	9	1.8	.5
14	.....	9	.....	56	7.5	1.8	.5
15	.....	4.5	.....	86	10	1.8	.5
16	.....	2.5	.....	77	10	1.8	.5
17	.....	.8	.....	65	10	1.8	.5
18	.....	.8	.....	58	10	1.8	.5
19	.....	.6	.....	52	10	1.3	.5
20	1.0	.3	270	56	7.5	1.0	.5
21	2.2	.3	3,090	56	7.5	1.0	.....
22	2.5	.3	5,020	47	7.5	1.0	.....
23	8	.3	1,540	47	7.5	1.0	.....
24	986	.3	1,320	47	7.5	1.0	.....
25	346	.3	4,420	41	7.5	1.0	.....
26	60	.3	1,810	36	5	1.0	.....
27	20	.3	886	32	5	1.0	.....
28	1.8	.2	454	31	5	1.0	.....
29	32	.2	.....	29	5	1.0	.....
30	26	.2	.....	26	5	1.0	.....
31	20	.2	.....	23	.....	1.0	.....

NOTE.—No flow Feb. 4–19 and June 21 to Sept. 30.

Monthly discharge of Coyote River at San Jose, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
December 20–31	986	1.0	125	2,980
January	1,330	.2	72.4	4,450
February	5,020	.0	672	37,300
March	381	23	82.4	5,070
April	20	5	10.8	643
May	3.8	1.0	1.84	113
June	1.0	.0	.383	23
July	.0	.0	.00	0
August	.0	.0	.00	0
September	.0	.0	.00	0
The period	.....	.....	.....	50,600

LAGUNA SECA AT COYOTE, CALIF.

LOCATION.—In La Laguna Seca grant at highway crossing just above junction with Coyote River, half a mile northwest of Coyote, Santa Clara County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1916, to August 14, 1917 (discharge measurements only).

DISCHARGE MEASUREMENTS.—Made by wading at or near highway culvert, 200 feet above mouth.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Laguna Seca at Coyote, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Discharge.	Date.	Made by—	Discharge.
		Sec.-ft.			*Sec.-ft.*
Dec. 20	W. O. Clark	4.6	Apr. 28	W. O. Clark	16
Jan. 9	Charles Leidl	7.8	May 2	F. C. Ebert	14
Feb. 19	W. O. Clark	9.0	June 11	W. O. Clark	15
Mar. 8	....do	19	25	H. D. McGlashan	11
18	....do	18	Aug. 14	J. F. Kunesh	5.1

ALAMEDA CREEK BASIN.

ALAMEDA CREEK AT SUNOLGLEN, CALIF.

LOCATION.—In the SE. ¼ sec. 7, T. 4 S., R. 1 E., at Sunol Dam, about 1 mile below junction with Arroyo de la Laguna and 1 mile west of Sunolglen, Alameda County.

DRAINAGE AREA.—620 square miles (measured by Spring Valley Water Co.).

RECORDS AVAILABLE.—October 4, 1900, to September 30, 1917.

GAGE.—Gurley electric water-stage recorder on upstream face of dam on left bank. Previous to 1914 a staff gage on upstream side of dam on right bank was used.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 400 feet above dam. Heavy weights and stay line are used for high-water measurements to insure correct position of current meter.

CHANNEL AND CONTROL.—The concrete dam acts as a control for the station. Channel above and below dam composed of gravel and boulders, and shifts during high water.

EXTREMES OF DISCHARGE.—1901–1917: Maximum mean daily discharge, 14,700 second-feet, March 7, 1911; minimum, no flow for part of nearly every year.

DIVERSIONS.—See Spring Valley Water Co.'s aqueduct near Sunolglen.

REGULATION.—None.

ACCURACY.—The dam has been rated in accordance with the cooperative agreement between the Spring Valley Water Co. and the city of San Francisco. Current meter measurements have been obtained by both parties and a rating curve developed, which has been accepted by both.

COOPERATION.—Records showing million gallons per day furnished by Spring Valley Water Co. through G. A. Elliott, chief engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Daily discharge, in second-feet, of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.0	1.1	.....	90	16	529	45	16	22	12	46	42
2	2.0	.9	.....	48	15	410	45	14	24	13	42	39
3	2.9	.9	18	924	15	350	45	14	22	13	42	42
4	2.9	.9	16	230	14	299	45	14	22	13	42	42
5	2.9	.9	18	740	14	270	40	14	20	22	42	42
6	2.9	2.0	11	145	15	235	40	14	18	18	24	42
7	2.9	2.0	21	80	15	335	35	15	17	15	13	42
8	2.0	1.1	15	50	15	145	35	15	15	22	13	39
9	2.9	1.1	6	40	14	230	35	16	15	22	13	39
10	6	.9	6	27	14	235	34	18	14	24	22	39
11	6	.....	6	35	15	120	33	17	14	24	27	39
12	6	.....	8	32	18	115	32	17	13	27	27	50
13	6	.....	8	30	16	115	26	16	13	29	27	50
14	6	.....	7	30	15	210	26	16	12	22	30	50
15	6	.....	7	28	15	170	26	17	12	32	32	57
16	6	.....	7	28	13	150	24	18	12	29	32	50
17	6	.....	6	22	12	115	24	18	13	29	32	50
18	6	.....	6	16	2.0	115	24	17	13	32	32	57
19	8	.....	6	15	11	105	24	17	14	32	32	57
20	8	.....	6	15	250	95	22	17	15	29	35	57
21	8	.....	7	15	4,400	60	22	16	10	36	35	57
22	8	.....	4.0	15	5,710	60	21	17	11	46	35	57
23	8	.....	12	15	1,640	65	21	19	18	46	35	57
24	8	.....	701	15	3,370	62	22	19	15	46	35	57
25	8	.....	145	14	7,110	60	22	24	15	46	39	57
26	8	.....	65	14	2,060	55	21	24	15	46	39	53
27	8	.....	48	14	1,500	50	21	24	15	46	39	53
28	8	.....	38	14	1,120	49	20	23	15	42	42	53
29	4.0	.....	50	14	.....	49	19	23	15	42	30	61
30	2.0	.....	65	15	.....	50	19	22	15	46	42	61
31	2.0	.....	90	18	.....	49	.....	22	.....	42	42	.....

NOTE.—Creek dry Nov. 11 to Dec. 2.

Monthly discharge of Alameda Creek at Sunolglen, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off, total in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8	2.0	5.34	328
November	2.0	.0	.39	23.2
December	701	.0	45.3	2,790
January	924	14	89.9	5,530
February	7,110	2.0	979	54,400
March	529	49	157	9,650
April	45	19	28.9	1,720
May	24	14	17.8	1,090
June	24	10	15.5	922
July	46	12	30.4	1,870
August	46	13	32.8	2,020
September	61	39	49.7	2,960
The year	7,110	0.0	115	83,300

ALAMEDA CREEK NEAR NILES, CALIF.

LOCATION.—In Niles Canyon, one-eighth mile below Southern Pacific Co.'s first bridge above Niles, one-fourth mile above highway bridge, and 1¼ miles northeast of Niles, Alameda County.

DRAINAGE AREA.—633 square miles (measured on topographic map by State water commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Water-stage recorder (Spring Valley Water Co. type) on right bank at highway water tank 1,800 feet above highway bridge.

DISCHARGE MEASUREMENTS.—Made from suspension foot-bridge 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; not permanent. Banks are high; channel straight from gage to some distance below suspension bridge. Low-water control for gage solid rock and boulders.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.45 feet at 5.30 a. m. February 25 (discharge, 10,160 second-feet); minimum discharge (stage not reported) 0.5 second-foot November 14–22.

DIVERSIONS.—Spring Valley Water Co. obtains water from the gravels at lower end of Livermore Valley, above station. (See Spring Valley Water Co.'s aqueduct near Sunolglen, p. 97.) Water for irrigation is diverted on right bank at Niles dam about a mile above station.

REGULATION.—Spring Valley Water Co. has under construction a large storage reservoir on Calaveras Creek. June 20 to September 30 water was released from Calaveras reservoir.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements, covering entire range of stage, were obtained. Rating curves well defined. Daily discharge determined by averaging the results obtained by applying mean gage height for short period to rating table. Special care exercised in making discharge measurements, maintaining water-stage recorder and other equipment, and compiling record. Records excellent for station of this type.

COOPERATION.—Data collected and compiled under presonal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek near Niles, Calif., during the year ending Sept. 30, 1917.

[Made by engineers of State Water Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 11	0.54	2.8	Jan. 4	3.59	1,100	Feb. 23	3.98	1,550
11	.....	2.0	4	3.53	1,020	23	3.27	997
17	.....	4.7	5	1.88	198	24	6.29	4,320
27	.90	12	8	1.42	74	25	10.09	9,610
31	.89	11	12	1.20	38	25	9.72	8,840
Nov. 8	.83	8.7	25	.89	11	26	4.92	2,390
11	.69	2.6	29	.90	11	26	4.41	1,940
14	.50	.4	29	.90	12	26	4.28	1,890
Dec. 4	.94	13	31	.96	16	27	4.01	1,610
4	.92	13	31	.96	16	27	4.10	1,710
5	.99	16	Feb. 1	.93	15	27	4.17	1,780
6	.70	4.7	5	.91	12	28	2.94	689
23	.84	9.0	16	.56	1.5	Mar. 1	2.62	463
23	.87	12	17	.72	4.7	2	2.43	383
23	2.27	300	19	.79	7.0	3	2.19	312
24	2.08	241	20	2.92	672	7	1.78	151
24	2.13	265	20	2.91	670	11	1.66	119
24	4.60	1,710	21	2.84	538	14	1.89	178
24	2.80	513	Feb. 21	3.17	730	19	1.58	102
31	1.11	26	21	3.30	938	19	1.58	98
Jan. 1	1.50	80	21	8.89	7,650	26	1.38	58
2	1.38	58	21	10.39	10,000	31	1.27	38
2	2.99	848	22	8.35	6,340	Apr. 11	1.08	23
3	3.11	836	22	7.16	4,790	July 3	.94	13
3	3.32	920	22	6.91	4,500			
3	3.23	799	23	4.44	1,960			

Daily discharge, in second-feet, of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	10	1.0	70	14	504	37	16	11.5	21.5	35.5	34
2	1.0	9.0	1.0	138	14.5	420	39	17	8.5	23	35.5	31
3	1.0	8.5	12.5	925	13.5	312	34	15	8.5	13.5	35.5	31
4	1.0	8.0	12.5	715	13	280	32.5	13	8.0	17	34.5	33
5	1.0	8.0	16	202	12.5	265	29.5	12	8.5	27.5	35.5	35.5
6	1.0	8.0	9.5	146	12.5	250	28	12.5	10	34.5	21.5	34.5
7	1.0	10	4.5	94	12.5	149	26	11.5	9.5	23	10.5	34.5
8	1.0	8.0	4.0	72.5	12.5	130	24	11	9.5	27.5	5.0	33.5
9	1.0	5.0	3.0	61.5	12.5	199	23.5	10	7.0	28.5	6.0	34.5
10	1.0	1.5	3.0	47.5	12.5	106	23.5	12	5.0	28.5	14	33.5
11	2.0	2.5	4.0	40.5	16.5	163	24	13.5	4.5	31	20.5	33.5
12	3.5	2.0	2.0	38	16.5	120	24.5	13.5	4.0	35.5	22.5	38.5
13	5.0	1.0	2.5	34.5	16	125	24	11.5	4.5	48	23	42.5
14	5.0	.5	3.0	35.5	10.5	184	22.5	9.5	4.5	43.5	28	44.5
15	5.0	.5	2.0	27	8.5	155	22	9.5	4.5	50	26.5	54
16	5.0	.5	1.0	16.5	2.0	135	23	11	4.0	48	27.5	43.5
17	5.0	.5	1.0	16.5	5.5	116	22	13	4.0	44.5	31	39.5
18	5.0	.6	1.0	14.5	6.5	108	22	15	4.5	34.5	26.5	43.5
19	7.5	.5	1.0	14.5	8.0	98.5	21	15	4.5	37	27.5	50.5
20	11.5	.5	1.5	16	188	89	21	11	4.5	34.5	28	50.5
21	11.5	.5	1.5	18.5	4,780	84	19.5	9.5	5.0	33.5	39.5	51.5
22	11.5	.5	2.5	15	6,055	76.5	20.5	10	8.5	39.5	33	48
23	11.5	1.0	43.5	12.5	1,605	73.5	20.5	11.5	27.5	40.5	33	49
24	11.5	1.0	813	12.5	3,420	65.5	20	13	28.5	39.5	32	49
25	11.5	1.0	235	12.5	8,020	64	20	12	29	37	31	48
26	11.5	1.0	101	12.5	2,265	55	19	8.5	28	37.5	35.5	49
27	11.5	1.0	66	12.5	1,675	45.5	19	9.0	27.5	37.5	35.5	50.5
28	11	1.0	59	13	1,110	46.5	17	11	25	37.5	38.5	50.5
29	11	1.0	53	12.5	.....	46.5	14	14	25	39.5	33	49
30	10.5	1.0	31	15.	.....	44.5	14.5	13	24.5	37.5	39.5	55
31	10	.....	25	16	.....	40	.....	12	.....	37	39.5	.....

Monthly discharge of Alameda Creek near Niles, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	11.5	1.0	6.05	372
November	10	.5	3.13	186
December	813	1.0	48.9	3,010
January	925	12.5	92.8	5,710
February	8,020	2.0	1,050	58,300
March	504	40	150	9,220
April	39	14	23.6	1,400
May	17	8.5	12.1	744
June	29	4.0	11.9	708
July	50	13.5	34.4	2,120
August	39.5	5.0	28.5	1,750
September	55	31	42.5	2,530
The year	8,020	.5	119	86,000

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

ALAMEDA CREEK NEAR DECOTO, CALIF.

LOCATION.—At Beard tract, 400 feet above mouth of Dry Creek, below Crandall Slough and about 1 mile southwest of Decoto, Alameda County; about 6¾ miles below station in Niles Canyon near Niles.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Water-stage recorder (Spring Valley Water Co. type) on left bank, 400 feet above mouth of Dry Creek.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge just above gage or by wading. Measurements are also made at Rodriguez bridge, about 1½ miles downstream, and results reduced by discharge of Dry Creek to give flow at gage.

CHANNEL AND CONTROL.—Gravel, sand, and silt; not permanent. Banks are high and steep and have been cleared in vicinity of station. At flood stage some water leaves channel through Crandall Slough, about 1½ miles above gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorders about 19.0 feet, 9 p. m. February 21, discharge, 8,900 second-feet; stream dry October 1 to December 23, February 9–11, 15–19, April 28 to July 16, and August 7–17.

DIVERSIONS.—See Alameda Creek near Niles, page 92. Water is also pumped from creek at four points above station for irrigation. At high stages water flows through Crandall Slough 1½ miles above gage. Some water is returned to creek at three gravel-washing plants between mouth of canyon and station.

REGULATION.—See Alameda Creek near Niles, page 92.

ACCURACY.—Stage-discharge relation not permanent. Frequent discharge measurements were obtained covering entire range of stage. Several well-defined rating curves were used during year. Daily discharge ascertained by averaging the results obtained by applying mean gage height for short period to rating table. Records excellent for station of this type.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Alameda Creek near Decoto, Calif., during the year ending Sept. 30, 1917.

[Made by engineers of State Water Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 24	11.40	875	Jan. 12[a]	4.06	24	Feb. 25	18.83	8,500
24[a]	.....	581	25[a]	3.04	1.1	25	19.00	8,830
28[a]	4.19	30	29[a]	2.94	.5	26	13.07	2,470
Jan. 1[a]	4.98	49	Feb. 1[a]	3.04	1.1	26	12.96	2,310
2[a]	4.71	36	5[a]	3.00	.5	26	12.44	1,980
3	11.50	952	21	9.93	605	26	12.44	1,970
3	11.10	643	21	10.05	610	27	11.88	1,510
3	11.27	837	21	10.72	839	27	11.88	1,520
3	11.32	814	22	18.92	8,710	Mar. 1	9.69	509
3	11.48	925	22	17.45	7,030	2	9.05	409
3	11.45	931	22	16.32	5,570	2	9.03	393
4	11.92	1,180	22	16.00	5,261	3	8.56	316
4	11.77	1,120	22	15.70	4,960	5	7.82	233
5	6.90	155	23	12.86	2,210	5[a]	7.84	237
5[a]	6.95	164	23	12.33	1,830	7	6.70	132
6	6.48	144	23	11.28	1,000	19[a]	5.77	91
6	6.33	136	23	11.19	1,010	26[a]	4.83	40
6[a]	6.46	144	24	13.75	2,920	31[a]	4.59	28
8[a]	5.09	61	24	17.30	6,560	Apr. 11[a]	3.96	10
8[a]	5.08	62	24	18.20	7,880			

[a] Measurement made at Rodrigues Bridge; discharge has been reduced by the amount flowing in Dry Creek.

Daily discharge, in second-feet, of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	July.	Aug.	Sept.
1	.....	47.5	1.5	523	25.5	.....	9.5	8.0
2	.....	54	1.5	388	25	.....	11	9.0
3	.....	807	.5	318	23	.....	12	10.5
4	.....	792	.5	264	20.5	.....	12	11.5
5	.....	180	1.0	231	18.5	.....	10	12
6	.....	137	.5	212	14.5	.....	7.0	12
7	.....	89	.5	144	12.5	.....	.....	12
8	.....	60.5	.5	123.5	12.5	.....	.....	11.5
9	.....	42	.....	165	13.5	.....	.....	12
10	.....	31.5	.....	201	13	.....	.....	12.5
11	.....	27	.....	135	11.5	.....	.....	13
12	.....	24.5	2.5	113.5	14	.....	.....	15
13	.....	24	4.0	109.5	11	.....	.....	19
14	.....	22	1.0	154	9.5	.....	.....	22.5
15	.....	19.5	.....	135	9.0	.....	.....	29
16	.....	15	.....	116	10	.....	.....	30.5
17	.....	8.0	.....	104.5	9.0	4.0	.....	19
18	.....	7.0	.....	95	8.5	9.5	1.5	28
19	.....	6.5	.....	91	6.5	9.5	3.5	29
20	.....	7.0	24	80	5.0	9.5	4.5	29.5
21	.....	6.5	3,865	72	3.0	9.5	8.0	30
22	.....	4.0	6,475	63	3.5	9.5	10	29
23	.....	2.0	1,840	56	6.0	9.5	6.0	31.5
24	680	1.0	2,850	47.5	5.5	9.5	6.5	31
25	261	1.0	7,760	42.5	4.0	9.5	6.5	30
26	97.5	1.5	2,485	40.5	2.0	9.5	8.5	29
27	41.5	1.5	1,630	35	1.0	9.5	11	28
28	31	1.0	1,216	32.5	.....	9.5	11.5	29.5
29	35.5	.5	.....	34	.....	9.5	12	27
30	27.5	.5	.....	34.5	.....	9.5	4.5	29.5
31	17	3.5	.....	31.5	.....	9.5	9.5	.....

NOTE.—No flow on days for which discharge is not given. In addition to discharge shown in above table, the flow in Crandall Slough during high water in February was as follows: Feb. 21, 225 second-feet; Feb. 22, 303 second-feet; Feb. 24, 10.5 second-feet; Feb. 25, 425 second-feet; no flow in slough during rest of year. For station on Crandall Slough, see p. 98.

Monthly discharge of Alameda Creek near Decoto, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0 0	0.0	0
November	.0	.0	.0	0
December	680	.0	38.4	2,360
January	807	.5	78.2	4,810
February	7,760	.0	1,010	56,100
March	523	31.5	135	8,300
April	25.5	.0	9.92	590
May	.0	.0	.0	0
June	.0	.0	.0	0
July	9.5	.0	4.42	272
August	12	.0	5.32	327
September	31.5	8.0	21.3	1,270
The year	7,760	.0	102	74,000

NOTE.—In addition to the discharge given for February, 1,910 acre-feet passed through Crandall Slough; no flow in slough for other months. Monthly discharge computed by engineers of the U. S. Geological Survey.

Monthly net inflow between stations on Alameda Creek near Niles and Decoto, Calif., for the year ending Sept. 30, 1917.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
October	3.0	184	May	5.0	307
November	3.0	179	June	4.5	268
December	4.0	246	July	4.0	246
January	2.0	123	August	4.0	246
February	3.0	167	September	5.5	327
March	6.0	369			
April	6.0	357	The year		3,020

NOTE.—Above table includes waste from flumes on right and left banks of Alameda Creek between gaging stations near Niles and near Decoto and water returned to creek at three gravel-washing plants. The water used at gravel plants is pumped from wells near creek. Water for irrigation was pumped from creek at four points.

SPRING VALLEY WATER CO.'S AQUEDUCT NEAR SUNOLGLEN, CALIF.

LOCATION.—In sec. 12, T. 4 S., R. 1 W., at Brightwise weirs, about 2½ miles west of Sunolglen, Alameda County.

RECORDS AVAILABLE.—April 6, 1903, to September 30, 1917.

GAGE.—Spring Valley water-stage recorder in pool above the weirs.

DISCHARGE.—Computed from gage-height record showing head over four rectangular weirs which are made of bronze. Each weir has a 30-inch crest.

EXTREMES OF DISCHARGE.—1903–1917: Maximum mean daily discharge reported, 47 second-feet March 21, 1914.

ACCURACY.—The weirs were very carefully installed and much care is exercised in their maintenance. There is no velocity of approach.

COOPERATION.—Records showing thousand gallons per day furnished by Spring Valley Water Co,. through G. A. Elliott, chief engineer. Daily discharge converted into second-feet and monthly discharge computed by engineers of United States Geological Survey.

Daily discharge, in second-feet, of Spring Valley Water Co.'s aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	34	32	35	33	21	33	34	33	26	33	33
2	26	34	33	31	33	22	34	32	33	26	33	33
3	26	34	30	33	33	32	34	34	33	26	33	33
4	26	34	33	33	33	33	34	35	33	26	33	32
5	26	34	33	33	33	33	33	34	33	27	32	32
6	26	34	33	33	33	33	35	34	33	26	32	32
7	26	34	33	33	32	33	36	34	33	26	34	31
8	26	34	32	33	33	33	34	34	33	26	34	31
9	26	33	24	33	32	35	34	34	33	26	34	31
10	26	34	16.1	33	32	36	34	34	34	26	34	31
11	26	34	33	33	30	35	33	34	33	26	34	31
12	26	34	33	33	33	35	34	34	34	26	34	31
13	26	34	33	33	33	34	34	34	34	26	34	31
14	26	34	31	33	33	35	35	34	34	26	34	32
15	26	34	33	33	29	35	34	34	34	26	33	32
16	25	34	33	33	29	34	36	34	34	26	34	33
17	21	34	33	33	32	34	34	34	34	26	31	35
18	6.3	34	32	31	33	34	34	34	34	26	34	32
19	4.4	34	33	33	35	34	34	34	34	28	34	32
20	6.9	35	33	33	34	34	34	34	34	27	34	32
21	3.8	34	33	33	33	34	35	33	34	27	27	32
22	26	34	33	33	34	33	34	33	34	27	25	31
23	25	34	32	33	34	33	35	34	27	27	34	31
24	26	34	33	33	33	34	34	34	26	26	34	31
25	26	34	33	33	35	34	34	33	26	34	35	31
26	34	34	33	33	33	34	33	34	26	34	34	31
27	34	33	33	33	33	34	34	34	26	34	34	31
28	34	33	33	33	32	34	34	33	26	33	34	31
29	34	33	33	33	.....	34	34	33	26	33	34	34
30	34	32	35	33	.....	34	34	33	26	34	35	34
31	34	.....	35	33	.....	35	.....	33	.....	33	33	.....

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	34	3.8	24.7	1,520
November	35	32	33.8	2,010
December	35	16.1	32.0	1,970
January	35	31	32.9	2,020
February	35	29	32.7	1,820
March	36	21	33.2	2,040
April	36	33	34.1	2,030
May	35	32	33.7	2,070
June	34	26	31.6	1,880
July	34	26	27.9	1,720
August	35	25	33.1	2,040
September	35	31	31.9	1,900
The year	36	3.8	31.8	23,000

CRANDALL SLOUGH NEAR CENTERVILLE, CALIF.

LOCATION.—Just below crossing of Centerville-Alvarado highway, about 1½ miles northwest of Centerville, Alameda County.

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Stevens 8-day water-stage recorder about 300 feet below highway crossing.

DISCHARGE MEASUREMENTS.—Left channel measured from cable one-fourth mile below gage; right channel from footbridge 500 feet below gage.

CHANNEL AND CONTROL.—Stream in one channel at gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.15 feet at 11.30 p. m. February 21 (discharge, 1,180 second-feet); channel dry during year, except February 21–22 and 24–25.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer; furnished for publication by State Water Commission of California.

Discharge measurements of Crandall Slough near Centerville, Calif., during the year ending Sept. 30, 1917.

[Made by engineers of State Water Commission.]

Date.	North channel.		South channel.		Date.	North channel.		South channel.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
Feb. 21	3.15	230	3.14	946	Feb. 24	.....	.....	2.33	387
22	.....	.....	.78	25	25	2.76	78	.....	.....
22	.....	.....	.60	6.8	25	3.08	205	3.04	856

NOTE.—Channel dry except Feb. 21–22 and 24–25; mean discharge on these days as follows:

	Second-feet.		*Second-feet.*
Feb. 21	225	Feb. 24	10.5
22	308	25	425
23	.0		

Total discharge for year, 1,910 acre-feet.

LAGUNA CREEK AT IRVINGTON, CALIF.

LOCATION.—At outlet of The Lagoon, a quarter of a mile north of Irvington, Alameda County.

DRAINAGE AREA.—10.8 square miles (measured on topographic map by State water commission).

RECORDS AVAILABLE.—October 1, 1916, to April 6, 1917.

GAGE.—Vertical staff on left bank just below outlet of The Lagoon; read by A. Peixotto.

DISCHARGE MEASUREMENTS.—Made by floats near gage.

CHANNEL AND CONTROL.—Bed overgrown with tule; current very sluggish.

EXTREMES OF DISCHARGE.—Maximum stage during year, 2.80 feet at about 4 p. m. February 27 (discharge, 7.5 second-feet); channel dry October 1 to November 18.

DIVERSIONS.—Water for irrigation is diverted from Mission and Rose creeks, feeders of Laguna Creek.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records roughly approximate.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Laguna Creek at Irvington, Calif., during the year ending Sept. 30, 1917.

[Made by engineers of State Water Commission.]

Date.	Gage geight.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 3	1.62	0.6	Jan. 12	2.21	1.8
23	1.88	.8	Feb. 27	1.69	7.4

Daily discharge, in second-feet, of Laguna Creek at Irvington, Calif., for the period Oct. 1, 1916, to Apr. 6, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	.....	0.4	2.0	1.3	6.0	0.9	16	.....	.8	1.6	1.0	2.7	.....
2	.....	.4	2.0	1.3	5.5	.9	17	.....	.8	1.6	.9	2.5	.....
3	.....	.6	2.0	1.3	5.0	.9	18	0.2	.8	1.6	.9	2.3	.....
4	.....	.6	2.0	1.3	4.4	.9	19	.3	.8	1.6	.9	2.1	.....
5	.....	.6	2.1	1.2	4.3	.8	20	.3	.8	1.5	1.0	1.9	.....
6	.....	.6	2.1	1.2	3.9	.8	21	.3	.8	1.5	1.4	1.7	.....
7	.....	.6	2.0	1.2	3.6	.....	22	.3	.9	1.5	1.9	1.5	.....
8	.....	.7	2.0	1.2	3.2	.....	23	.3	.9	1.4	2.0	1.4	.....
9	.....	.7	1.9	1.1	3.9	.....	24	.3	1.1	1.4	3.6	1.4	.....
10	.....	.7	1.9	1.1	3.7	.....	25	.3	1.2	1.4	6.2	1.3	.....
11	.....	.7	1.8	1.1	3.5	.....	26	.4	1.2	1.5	7.4	1.3	.....
12	.....	.7	1.8	1.1	3.1	.....	27	.4	1.2	1.4	7.5	1.2	.....
13	.....	.7	1.8	1.1	3.1	.....	28	.4	1.2	1.4	7.2	1.2	.....
14	.....	.8	1.7	1.0	3.1	.....	29	.4	1.3	1.5	.....	1.1	.....
15	.....	.8	1.7	1.0	2.9	.....	30	.4	1.3	1.4	.....	1.0	.....
							31	.....	1.4	1.4	.....	1.0	.....

NOTE.—Channel dry Oct. 1 to Nov. 17.

Monthly discharge of Laguna Creek at Irvington, Calif., for the period Oct. 1, 1916, to Apr. 6, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.00	0.0
November	.4	.0	.14	8.3
December	1.4	.4	.84	51.6
January	2.1	1.4	1.69	104
February	7.5	.9	2.12	118
March	6.0	1.0	2.74	168
April 1-6	.9	.8	.87	10.4
The period				460

DRY CREEK NEAR DECOTO, CALIF.

LOCATION.—Just below Niles-Alvarado highway bridge, about one-fourth mile above junction with Alameda Creek, and 1 mile southwest of Decoto, Alameda County.

DRAINAGE AREA.—9.4 square miles above floor of valley (measured on topographic map by State Water Commission).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Lietz water-stage recorder on right bank 500 feet below highway bridge.

DISCHARGE MEASUREMENTS.—Made from foot-bridge just above gage or by wading.

CHANNEL AND CONTROL.—Small gravel; shifting. Banks high and cleared in vicinity of station.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.5 feet at 7 p. m. February 24 (discharge, 87 second-feet); channel dry several months during the year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. The two rating curves used during year are fairly well defined. Daily discharge determined by averaging results obtained by applying to rating table mean gage height for short period. Records fair.

COOPERATION.—Data collected and compiled under personal supervision of Paul Bailey, engineer, and furnished for publication by State Water Commission of California.

Discharge measurements of Dry Creek near Decoto, Calif., during the year ending Sept. 30, 1917.

[Made by engineers of State Water Commission.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 3	1.76	28	Jan. 8	0.97	2.2	Feb. 26	2.17	32
5	1.20	9.4	Feb. 22	1.78	29	Mar. 19	1.36	1.0
6	1.12	6.6	24	3.10	86			

Daily discharge, in second-feet, of Dry Creek near Decoto, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Day.	Dec.	Jan.	Feb.	Mar.
1		12		11.5	16				2.0
2		16.5		9.0	17				2.0
3		23.5		7.0	18				1.0
4		8.5		6.0	19				1.0
5		8.5		5.0	20				.5
6		6.5		4.5	21			55	.5
7		3.0		3.5	22			34	.5
8		2.0		2.5	23			14	
9		1.0		8.5	24			87	
10				5.5	25			58.5	
11				4.5	26			27.5	
12				3.5	27			16.5	
13				3.5	28			12.5	
14				3.5	29				
15				3.0	30				
					31	7.5			

NOTE.—Channel dry Oct. 1 to Dec. 30; Jan. 10 to Feb. 20; and Mar. 23 to Sept. 30.

Monthly discharge of Dry Creek near Decoto, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0.0
November	.0	.0	.0	.0
December	7.5	.0	.24	14.8
January	23.5	.0	2.63	162
February	87	.0	10.9	605
March	11.5	.0	2.85	175
April	.0	.0	.0	.0
May	.0	.0	.0	.0
June	.0	.0	.0	.0
July	.0	.0	.0	.0
August	.0	.0	.0	.0
September	.0	.0	.0	.0
The year	87	.0	1.32	957

KERN RIVER BASIN.

KERN RIVER NEAR KERNVILLE, CALIF.

LOCATION.—In sec. 14, T. 23 S., R. 32 E., at base of Fairview Mountain, in Tulare County, in Kern National Forest, 3 miles above Salmon Creek and about 15 miles north of Kernville, Kern County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1917.

GAGE.—Friez water-stage recorder on left bank about 1 mile above mouth of Tobias Creek. Original gage was vertical staff in three sections fastened to overhanging willow tree on left bank about 160 feet above recorder. From April 1 to September 14, 1913, readings were taken from a temporary staff gage in two sections a quarter mile upstream. The readings were reduced to the original gage by a relation curve. The first gage was replaced March 17, 1914, by a vertical staff in two sections, 7 feet downstream from the original one, on the same bank and at the same datum. The recorder was installed September 15, 1913, in the same pool and at the same datum.

DISCHARGE MEASUREMENTS.—Made from cable about 90 feet below recorder or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.7 feet at 9 a. m. June 17 (discharge, 3,800 second-feet); minimum stage from water-stage recorder, −0.14 foot September 29 (discharge, 255 second-feet).

1912–1917: Maximum stage recorded, 8.8 feet from water-stage recorder at 4 p. m. January 17, 1916 (discharge, 9,690 second-feet); minimum stage recorded, −0.75 foot January 6, 1913 (discharge, 142 second-feet).

DIVERSION.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since station was established. Rating curve well defined below 6,000 second-feet and extended above. Daily discharge ascertained by means of a discharge integrator. Records excellent.

COOPERATION.—Station maintained in cooperation with Southern California Edison Co. through H. W. Dennis, construction engineer.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Kern River near Kernville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	482	a 441	349	462	369	567	950	1,690	2,010	1,760	748	377
2	703	a 443	362	440	359	531	943	1,680	2,300	1,780	780	370
3	630	a 444	392	455	377	507	981	1,740	2,470	1,780	730	373
4	590	a 446	426	418	385	520	1,100	1,850	2,580	1,770	700	371
5	570	448	400	402	413	557	1,290	1,920	2,540	1,730	657	378
6	584	430	392	390	421	615	1,490	2,060	2,600	1,660	624	380
7	590	470	360	383	417	622	1,660	2,230	2,790	1,600	594	370
8	565	455	327	376	424	641	1,820	2,050	3,080	1,540	565	365
9	569	455	353	390	412	672	1,710	1,920	3,330	1,400	532	358
10	559	455	338	397	420	609	1,440	1,870	3,300	1,280	511	326
11	560	448	323	400	402	540	1,370	1,950	2,940	1,240	510	315
12	571	428	349	395	396	497	b 1,440	1,990	2,870	1,200	567	307
13	567	385	344	387	398	496	b 1,330	2,180	2,910	1,180	593	301
14	553	365	332	364	392	510	b 1,320	2,430	3,090	1,250	596	299
15	570	388	310	353	397	468	1,270	2,480	3,300	1,250	620	291
16	568	387	315	313	397	458	1,190	2,360	3,460	1,510	677	289
17	560	370	315	344	437	464	1,050	2,390	4,480	1,600	590	286
18	563	376	315	366	414	494	1,010	2,310	3,520	1,300	550	285
19	540	379	317	403	391	528	972	2,070	3,360	1,210	519	283
20	513	368	325	402	390	557	1,020	1,840	3,190	1,180	486	282
21	503	368	317	359	433	604	1,150	1,780	2,950	1,090	460	290
22	489	367	316	368	650	608	1,290	1,960	2,760	1,020	445	290
23	472	363	315	358	660	578	1,470	1,970	2,580	973	435	286
24	470	362	277	360	680	589	1,690	1,980	2,590	918	430	287
25	453	349	209	357	1,170	664	1,920	1,830	2,400	850	427	286
26	442	350	345	366	797	780	2,170	1,730	2,320	850	430	278
27	432	358	472	326	665	923	2,170	1,750	2,260	990	408	272
28	a 434	352	485	384	598	1,130	1,940	1,840	2,170	928	400	263
29	a 436	346	485	369	.....	1,230	1,790	1,800	1,980	800	397	255
30	a 437	346	484	385	.....	1,220	1,660	1,930	1,810	775	390	258
31	a 439	.....	473	373	.....	1,050	.....	2,010	.....	723	377	.....

a Interpolated. b Partly estimated from incomplete hydrograph.

Monthly discharge of Kern River near Kernville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	703	432	529	32,500
November	470	346	371	22,100
December	485	209	359	22,100
January	462	313	382	23,500
February	1,170	359	488	27,100
March	1,230	458	653	40,200
April	2,170	943	1,420	84,500
May	2,480	1,680	1,990	122,000
June	3,520	1,810	2,760	164,000
July	1,780	723	1,260	77,500
August	780	377	540	33,200
September	380	255	312	18,600
The year	3,520	209	923	667,000

KERN RIVER NEAR BAKERSFIELD, CALIF.[1]

LOCATION.—In sec. 2, T. 29 S., R. 28 E., at mouth of lower canyon, 5 miles northeast of Bakersfield, Kern County.

DRAINAGE AREA.—2,345 square miles.

RECORDS AVAILABLE.—January 1, 1894 to June 30, 1907, and March 1, 1908, to September 30, 1917.

GAGE.—Water-stage recorder at footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Shifting sand.

EXTREMES OF DISCHARGE.—1896–1918: Maximum stage recorded, January 26, 1914 (discharge, 18,287 second-feet); minimum stage recorded, September 15, 1898 (discharge, 80 second-feet).

DIVERSION.—Several small diversions on main river and South Fork for irrigation. Water diverted at and below Kernville for power development is returned to the river above the station.

REGULATION.—No information.

ACCURACY.—Records considered good.

COOPERATION.—Complete record, except run-off in acre-feet, furnished by Kern County Land Co., through A. K. Warren, engineer.

[1] Station also known as at "first point of measurement."

Daily discharge, in second-feet, of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	507	561	469	646	629	1,052	1,586	2,474	2,612	1,961	774	400
2	584	552	467	647	605	977	1,466	2,486	2,758	1,878	767	386
3	784	536	479	1,007	604	902	1,455	2,507	2,965	1,870	787	365
4	775	535	529	987	599	862	1,508	2,570	3,104	1,863	773	355
5	720	547	615	787	611	861	1,616	2,663	3,061	1,836	749	354
6	706	559	575	704	638	906	1,868	2,766	2,956	1,777	728	373
7	748	541	542	652	659	983	2,145	2,960	3,046	1,714	703	363
8	773	544	496	615	664	997	2,414	3,010	3,254	1,617	684	358
9	754	566	480	607	654	1,018	2,584	2,799	3,468	1,542	648	362
10	712	576	475	621	659	1,098	2,300	2,679	3,665	1,399	617	356
11	735	585	476	639	652	999	2,057	2,654	3,557	1,287	595	340
12	728	577	475	646	660	926	2,009	2,741	3,216	1,273	580	332
13	705	570	489	642	660	892	2,130	2,842	3,127	1,221	606	343
14	705	527	511	632	656	892	2,127	3,079	3,280	1,188	636	332
15	691	487	498	615	659	890	2,050	3,176	3,537	1,239	661	326
16	710	490	491	606	648	849	1,906	3,170	3,773	1,259	660	319
17	717	493	472	579	654	851	1,780	3,068	3,784	1,533	680	302
18	714	499	468	549	695	873	1,566	3,079	3,911	1,459	641	303
19	722	493	475	572	651	911	1,484	2,943	3,976	1,287	577	307
20	701	473	475	642	685	946	1,468	2,693	3,806	1,220	558	307
21	665	461	482	648	709	937	1,575	2,561	3,613	1,159	531	304
22	656	474	482	607	895	1,010	1,817	2,475	3,330	1,122	511	307
23	666	475	467	597	1,295	1,019	2,043	2,487	3,126	980	497	309
24	649	480	583	583	1,221	992	2,399	2,460	2,931	946	482	316
25	645	492	911	590	1,259	1,016	2,751	2,484	2,763	938	494	313
26	627	502	540	613	1,767	1,135	3,207	2,378	2,636	881	491	311
27	614	498	431	636	1,370	1,247	3,455	2,309	2,503	888	493	300
28	609	504	551	649	1,178	1,466	3,336	2,399	2,416	986	461	297
29	592	491	610	661	.....	1,732	2,946	2,404	2,293	977	444	294
30	576	481	648	635	.....	1,860	2,642	2,384	2,137	850	418	295
31	569	.....	656	628	.....	1,791	.....	2,521	.....	825	404	.....

Monthly discharge of Kern River near Bakersfield, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	875	498	679	41,800
November	591	448	519	30,900
December	1,071	418	526	32,300
January	1,329	486	653	40,200
February	1,927	563	808	44,900
March	1,984	806	1,061	65,200
April	3,560	1,421	2,123	126,000
May	3,265	2,260	2,684	165,000
June	4,331	1,982	3,153	188,000
July	2,078	781	1,322	81,300
August	817	393	602	37,000
September	406	291	331	19,700
The year	4,331	291	1,205	872,000

NOTE.—Maximum and minimum discharge determined from maximum and minimum gage heights as recorded by company's water-stage recorder.

TULARE LAKE BASIN.

TULARE LAKE IN KINGS COUNTY, CALIF.

LOCATION.—At head gate at corner of north-south and east-west levees on G. Albert Smith ranch, at quarter corner between secs. 8 and 17, T. 21 S., R. 20 E., about 5 miles southwest of Stratford.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15, 1906, to September 30, 1917 (incomplete). All published records give actual depth of water on the lowest point of the lake bed.

GAGE.—Vertical staff in three sections, two of which are fastened to the headgate. High-water section is at junction of Smith's levee and the Empire levee two miles north. Gage read about once a week by Mrs. E. G. Kolbenstetter. Gage readings reduced to depth of water from the following data: Elevation of bottom of lake, 179.1 feet above mean sea level; elevation of zero of gage, 176.4 feet.

During 1906 and a part of 1907 the readings were from a gage near the entrance of Kings River near Lemoore, at the middle of sec. 4, T. 21 S., R. 20 E. The zero of that gage was at 175.1 feet elevation. May 11, 1907, a staff gage was set near Corcoran, with its datum at the same elevation, and was used until July 30, 1909. July 28, 1910, a vertical staff was installed on the section line just south of the corner of secs. 27, 28, 33 and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore, near Stratford post office. The elevation of the zero of this gage was 171.0 feet. On August 20, 1913, a vertical staff in four sections was installed in main north and south waterway, 4 to 6 miles southeast of Stratford, its zero was also at elevation 171.0 feet. Sections No. 1 and No. 2 were 1 mile south of 1910 gage in sec. 3, T. 21 S., R. 20 E. No. 3 was in sec. 10 and No. 4 was in sec. 15, 1 and 2 miles, respectively, south of sections Nos. 1 and 2.

The present gage was installed May 15, 1914, on account of the rebuilding of the levees. A high-water section on the levee near by, added July 16, 1916, was used up to October 28, 1916. The present high-water section was installed October 28, 1916.

EXTREMES OF STAGE.—Maximum depth recorded during year, 9.1 feet February 18; minimum depth recorded, 6.6 feet September 22 and 30.

1906–1917: Maximum depth, 14.0 feet June 21, 1907; the lake was empty a period in 1906, the last part of October to the last part of December, 1914, and last part of November, 1915.

The lake is roughly rectangular and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran and the water surface about 12 feet below.

The lake bed resembles a flat saucer. The flat, level area in the bottom is approximately 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural outflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

Depth, in feet, of Tulare Lake in Kings County, Calif., for the year ending Sept., 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1											
2											[n]7.1
3		[s]8.8				[n]8.9					
4				9.0	[s]9.0						
5	[n]9.0										
6							[n]8.3	[n]8.0			
7			9.0							7.6	
8						[n]8.8					
9											
10		[n]8.8						[n]8.0			
11					[s]9.0						
12									[s]8.3	[n]7.4	[n]6.9
13	[n]8.9						[n]8.2				
14											
15				8.9		[n]8.8					
16									8.3		
17		[n]8.8						[n]8.0			
18				[s]9.1	[n]9.0						
19	[n]8.8										
20							[n]8.2			[n]7.3	
21			[n]8.8								
22						[n]8.6			[n]8.0		[n]6.6
23											
24								[s]8.4			
25				[s]9.0	[n]8.9						
26	[s]9.0										
27							[n]8.1				
28			[s]9.0								
29											
30											[n]6.6
31		8.8									

[n] Wind blowing from the north. [s] Wind blowing from the south.

DEER CREEK AT HOT SPRINGS, CALIF.

LOCATION.—Below footbridge at forest supervisor's headquarters in Sequoia National Forest, about a half mile below Hot Springs, Tulare County. Tyler Creek enters about 2½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1910, to September 30, 1917 (incomplete).

GAGE.—Vertical staff fastened to an alder tree on left bank, 30 feet below footbridge; read by employees of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from highway bridge 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.4 feet at 8 a. m. February 22 (discharge, 55 second-feet); minimum stage recorded, 0.4 foot September 26–30 (discharge, 1.7 second-feet).

1910–1917: Maximum stage recorded, 4.5 feet at 4 p. m. January 27, 1916 (discharge, from extension of rating curve, 540 second-feet); minimum stage recorded, 0.24 foot August 14–16, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation changed during April. Rating curve before change fairly well defined between 5 and 50 second-feet and extended above. Rating curve after change fairly well defined between 2 and 40 second-feet and extended above. Gage read to tenths feet once daily November to May; half-tenths in June and quarter-tenths July to September. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Deer Creek at Hot Springs, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 26	0.59	7.3
Apr. 6	1.06	30
May 30	1.05	27

Daily discharge, in second-feet, of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	7.8	7.8	7.8	21	.....	24	24	14	6.5	2.8
2	.....	.....	7.8	7.8	7.8	21	.....	24	24	14	6.5	2.8
3	.....	.....	21	28	7.8	18	.....	24	24	14	6.5	2.8
4	.....	.....	40	21	7.8	16	.....	24	24	12	6.0	2.8
5	.....	.....	16	16	7.8	16	.....	24	24	12	5.2	2.8
6	.....	.....	12	12	12	16	30	24	24	11	4.3	3.4
7	.....	.....	12	12	12	16	.....	30	24	11	3.8	3.4
8	.....	.....	7.8	12	7.8	16	.....	30	24	9.8	3.8	3.4
9	.....	.....	7.8	12	7.8	21	.....	30	24	9.8	3.8	3.4
10	.....	.....	7.8	12	7.8	21	.....	30	24	9.8	3.8	3.4
11	.....	.....	7.8	12	7.8	21	.....	30	24	9.8	3.8	3.4
12	.....	.....	7.8	12	7.8	16	.....	30	24	9.8	3.8	2.8
13	.....	.....	7.8	12	12	16	.....	30	24	9.8	3.8	2.8
14	.....	.....	7.8	12	12	21	.....	30	24	9.8	3.8	2.8
15	.....	7.8	7.8	12	12	16	.....	30	24	9.8	3.8	2.8
16	.....	7.8	7.8	7.8	12	16	.....	30	24	9.8	3.8	2.8
17	.....	7.8	7.8	4.8	16	21	.....	30	21	9.8	3.8	2.8
18	.....	7.8	7.8	7.8	12	21	.....	44	18	9.8	3.8	2.3
19	.....	7.8	7.8	7.8	12	21	.....	30	16	8.2	3.8	2.3
20	.....	7.8	7.8	7.8	21	21	.....	24	16	7.2	3.8	2.3
21	.....	7.8	7.8	4.8	23	21	.....	24	16	7.2	3.8	2.3
22	.....	7.8	7.8	7.8	55	21	.....	24	16	6.5	2.8	2.1
23	.....	7.8	7.8	7.8	40	21	.....	24	16	6.5	2.8	2.1
24	.....	7.8	40	7.8	33	21	.....	24	16	6.5	2.8	2.1
25	.....	7.8	16	7.8	33	21	.....	24	18	6.5	2.8	2.1
26	7.3	7.8	12	7.8	26	21	.....	24	18	6.5	2.8	1.7
27	.....	7.8	12	7.8	26	23	.....	24	18	6.5	2.8	1.7
28	.....	7.8	12	7.8	21	23	.....	24	18	6.5	2.8	1.7
29	.....	7.8	12	12	.....	21	.....	24	16	6.5	2.8	1.7
30	.....	7.8	7.8	7.8	.....	21	.....	25	16	6.5	2.8	1.7
31	.....	.....	7.8	7.8	.....	23	.....	24	.....	6.5	2.8	.....

NOTE.—No record Oct. 1 to Nov. 14 and Apr. 1–30.

Monthly discharge of Deer Creek at Hot Springs, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 15–30	7.8	7.8	7.80	248
December	40	7.8	11.6	713
January	28	4.8	10.4	639
February	55	7.8	16.7	927
March	23	16	19.6	1,210
May	44	24	27.0	1,660
June	24	16	20.8	1,240
July	14	6.5	9.14	562
August	6.5	2.8	3.87	238
September	3.4	1.7	2.58	154

TULE RIVER NEAR PORTERVILLE, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 25, T. 21 S., R. 28 E., below highway bridge near McFarland ranch, about 1 mile above mouth of South Fork and 6 miles east of Porterville, Tulare County. North and Middle forks of Tule River unite about 9 miles above station.

DRAINAGE AREA.—266 square miles.

RECORDS AVAILABLE.—May 1, 1901, to September 30, 1917.

GAGE.—Staff in four sections on right bank 75 feet below bridge; read by Mrs. Martha Brough and G. B. Kieffer. Staff sections Nos. 1, 3, and 4 are vertical; No. 2 is inclined. Original gage was on the same bank 200 feet below bridge and at same datum. There have been several changes in the number and kinds of staff sections but the same datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts slightly during high water. Left bank is low and wooded; subject to overflow above a stage of about 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.2 feet at 1 p. m. December 24 (discharge, determined from extension of rating curve, 4,260 second-feet); minimum stage recorded, 0.56 foot at 6 p. m. September 21 (discharge, 7.0 second-feet.

1901–1917: Maximum stage recorded, 11.0 feet at 11.30 p. m. January 17, 1916 (discharge, determined from extension of rating curve, 6,780 second-feet); minimum stage recorded, 0.2 foot August 22, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Several small irrigation ditches divert water above the station.

REGULATION.—Power is developed on the Middle Fork and on the North and South forks of the Middle Fork.

ACCURACY.—Stage-discharge relation did not change during year. Rating curve fairly well defined below 3,000 second-feet; extended above. Gage read to quarter-tenths (sometimes hundredths) once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of Tule River near Porterville, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 25	1.33	64	May 29	2.55	305	July 20	1.13	43
Apr. 6	2.98	460	June 13	2.57	317			

Daily discharge, in second-feet, of Tule River near Porterville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	102	51	60	135	115	270	299	410	329	118	24	12
2	427	49	60	118	115	243	270	410	360	115	26	11
3	135	48	115	955	115	230	270	376	393	99	26	11
4	110	46	110	284	118	218	270	393	393	94	26	10
5	28	102	102	195	118	218	344	393	376	90	23	8.5
6	135	87	102	174	135	230	427	445	393	87	23	8.5
7	126	74	94	154	144	243	500	463	393	87	22	8.5
8	102	74	87	135	144	243	538	445	410	84	20	8.5
9	102	72	74	126	144	344	538	427	427	77	19	8.5
10	135	69	72	126	144	270	427	376	410	72	19	8.5
11	102	69	68	126	135	270	360	393	376	64	18	8.5
12	94	68	62	126	135	230	360	427	393	63	19	8.5
13	87	68	62	126	132	240	376	463	329	62	19	8.5
14	87	62	62	135	126	256	410	500	329	60	19	8.5
15	87	62	62	135	118	218	360	538	299	56	19	8.5
16	87	62	62	118	118	195	360	463	284	60	19	8.5
17	87	62	56	102	195	195	314	463	299	53	19	8.5
18	87	60	56	102	135	218	284	538	299	49	18	8.5
19	80	60	56	102	164	218	270	463	270	47	17	8.5
20	74	60	56	102	900	218	256	393	256	45	17	8
21	74	60	56	102	463	218	299	360	243	43	17	7
22	68	60	56	99	2,730	218	329	360	218	39	16	8.5
23	68	60	64	99	800	218	360	360	218	41	16	9
24	66	60	3,540	99	463	218	410	329	195	36	16	10
25	62	60	299	99	710	243	500	329	184	30	16	12
26	62	62	195	102	445	270	578	329	166	28	15	12
27	56	62	144	102	360	299	538	329	154	27	15	10
28	56	62	164	110	299	410	500	329	144	28	15	10
29	56	62	126	118	.....	463	463	329	135	28	15	9
30	51	62	118	118	.....	427	393	344	132	26	14	9
31	51	.....	118	118	.....	360	.....	329	.....	26	12	.....

Monthly discharge of Tule River near Porterville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	427	28	96.0	5,840
November	102	46	63.8	3,800
December	3,540	56	205	12,600
January	955	99	153	9,410
February	2,730	115	347	19,300
March	463	195	262	16,100
April	578	256	387	23,000
May	538	329	403	24,800
June	427	132	294	17,500
July	118	26	59.2	3,640
August	26	12	18.7	1,150
September	12	7	9.20	547
The year	3,540	7	190	138,000

SOUTH FORK OF TULE RIVER NEAR PORTERVILLE,[1] CALIF.

LOCATION.—Opposite Indian school in Tule Indian Reservation, 2 miles below mouth of Rocky Creek, 7 miles southeast of Success, about 8 miles above junction with Tule River, and 14 miles southeast of Porterville, Tulare County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 10, 1910, to September 30, 1917.

GAGE.—Vertical staff on right bank 30 feet above pump house; read by employees of United States Indian Service. Up to September 30, 1916, gage was installed on left bank 100 feet above pump house and at a different datum.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough; shifts slightly during high water. Both banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet at 10 a. m. December 23 (discharge, determined from extension of rating curve, 435 second-feet); minimum stage recorded, 0.8 foot September 3–23, 26–30 (discharge, 4.2 second-feet.)

1910–1917: Maximum stage recorded, 8 feet at 8 a. m. January 26, 1914 (discharge, determined from extension of rating curve, about 2,750 second-feet); minimum stage recorded, zero on gage August 4–16, 18–26, September 11–22, and October 1, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Several small irrigation ditches, having a total capacity of about 12 second-feet, divert water above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 4 second-feet and 200 second-feet and extended above. Gage read to tenths once daily, sometimes oftener and occasionally more accurately. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by F. A. Virtue.

Discharge measurements of South Fork of Tule River near Porterville, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 25	1.19	17	May 29	1.99	86	July 20	1.18	19
Apr. 6	2.23	121	June 13	1.82	68			

[1] Originally known as "near Success."

Daily discharge, in second-feet, of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	.....	18	.....	.....	89	89	.....	77	38	14	6.5
2	89	.....	24	65	.....	77	89	.....	77	31	13	6.5
3	65	.....	38	65	.....	71	89	.....	77	31	13	4.2
4	38	.....	38	55	.....	65	89	.....	77	31	13	4.2
5	18	.....	38	55	.....	71	103	.....	77	31	12	4.2
6	65	.....	31	46	.....	71	118	.....	77	31	12	4.2
7	31	.....	31	46	.....	71	134	.....	77	31	11	4.2
8	31	.....	31	46	.....	77	142	.....	77	31	11	4.2
9	24	.....	24	46	.....	89	142	.....	77	24	11	4.2
10	24	.....	24	46	.....	83	118	.....	77	24	10	4.2
11	24	.....	24	46	.....	83	103	.....	77	24	10	4.2
12	31	.....	18	46	.....	73	110	.....	77	24	9.5	4.2
13	31	.....	18	46	.....	67	103	.....	65	24	9.5	4.2
14	31	.....	18	46	.....	85	118	.....	65	24	9.5	4.2
15	31	.....	18	38	.....	73	96	.....	65	24	9.5	4.2
16	24	.....	18	38	.....	65	103	.....	65	18	9.5	4.2
17	24	.....	18	38	.....	77	89	.....	55	18	9.5	4.2
18	24	.....	24	38	.....	77	83	.....	55	18	9.5	4.2
19	24	.....	24	38	.....	81	77	.....	55	18	9.5	4.2
20	18	.....	24	38	.....	77	77	103	55	18	9.5	4.2
21	18	.....	24	38	.....	77	.....	103	55	18	9.5	4.2
22	18	.....	38	38	268	77	.....	89	55	14	9.5	4.2
23	18	.....	435	38	240	77	.....	89	46	14	6.5	4.2
24	18	.....	.....	38	170	77	.....	103	46	14	6.5	6.5
25	18	.....	.....	38	170	81	.....	89	46	14	6.5	6.5
26	18	18	.....	38	134	89	.....	89	46	14	6.5	4.2
27	14	18	.....	38	110	96	.....	89	46	14	6.5	4.2
28	14	18	.....	.....	96	126	.....	89	46	14	6.5	4.2
29	.....	18	.....	.....	.....	134	.....	89	38	14	6.5	4.2
30	.....	18	.....	.....	.....	134	.....	89	38	14	6.5	4.2
31	.....	.....	.....	.....	.....	110	.....	89	.....	14	6.5	.....

NOTE.—No. record Oct. 29 to Nov. 25, Dec. 24 to Jan. 1, Jan. 28 to Feb. 21, and Apr. 21 to May 19. Discharge June 4, 5, 27 and Aug. 2-11 interpolated.

Monthly discharge of South Fork of Tule River near Porterville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October 1-28	89	14	28.6	1,590
November 26-30	18	18	18.0	179
December 1-23	435	18	43.4	1,980
January 2-27	65	38	44.2	2,280
February 22-28	268	96	170	2,360
March	134	65	83.9	5,160
April 1-20	142	77	104	4,130
May 20-31	103	89	92.5	2,200
June	77	38	62.2	3,700
July	38	14	21.6	1,330
August	14	6.5	9.45	581
September	6.5	4.2	4.51	268

KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 27, T. 17 S., R. 28 E., at J. O. Carter's ranch, 1¼ miles southwest of Three Rivers, Tulare County. South Fork enters three-fourths mile and North Fork 3 miles above station.

DRAINAGE AREA.—520 square miles.

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1917.

GAGE.—United States Weather Bureau gage in three sections on left bank a few feet above cable and one-fourth mile back of observer's house; read by J. O. Carter. The original gage was installed by the United States Geological Survey at same location and datum. On December 5, 1912, the Weather Bureau gage was installed. For about two years the two gages were read interchangeably, according to varying conditions of repair of each. On October 19, 1914, the Geological Survey repaired the upper section of the Weather Bureau gage and has used this gage since.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet, determined from flood marks, night of February 21 (discharge, from extension of rating curve, about 6,270 second-feet); minimum stage recorded, 4.75 feet at 6 p. m. September 29 (discharge, 46 second-feet).

1903–1917: Maximum stage recorded, 13.5 feet at 11 a. m. January 17, 1916 (discharge, from extension of rating curve, about 14,700 second-feet); minimum stage recorded, 4.35 feet August 22, 1914 (discharge, 30 second-feet).

DIVERSIONS.—Several small ditches divert water for local irrigation and domestic use above the station.

REGULATION.—Power is developed on the Middle and East forks but effect of regulation is thought to be small.

ACCURACY.—Rating curve well defined between 40 and 4,000 second-feet; above 4,000 second-feet it is an extension. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for extremely high stages which are probably good.

Discharge measurements of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	Charles Leidl	5.31	192	June 1	Charles Leidl	7.16	1,690
Dec. 4	J. F. Kunesh	5.38	217	14	do	7.55	2,140
4	do	5.36	206	July 18	do	5.95	486
Apr. 8	Charles Leidl	7.24	1,750				

Daily discharge, in second-feet, of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	296	145	105	260	217	620	700	1,400	1,800	930	244	65
2	1,020	133	115	234	217	510	660	1,400	2,040	930	240	62
3	481	139	209	1,260	226	510	700	1,350	2,160	880	213	65
4	360	139	190	488	243	478	880	1,570	2,160	830	202	68
5	316	187	190	349	296	510	1,130	1,680	2,040	785	187	65
6	425	202	209	287	296	510	1,400	1,920	2,290	740	172	65
7	373	209	172	269	305	545	1,570	2,040	2,420	740	165	65
8	327	202	152	251	296	545	1,800	1,570	2,690	660	155	65
9	327	187	145	251	305	620	1,570	1,570	2,830	660	139	63
10	344	194	133	251	305	580	1,240	1,460	2,690	545	139	60
11	327	187	124	260	305	510	580	1,680	2,290	510	139	58
12	292	165	139	264	282	445	620	1,680	2,290	478	127	57
13	292	165	139	264	278	445	930	2,040	2,290	510	133	57
14	292	152	133	269	274	478	1,300	2,290	2,420	510	127	58
15	322	142	130	269	269	418	1,030	2,290	2,420	478	124	58
16	349	133	127	230	269	418	980	2,040	2,550	510	112	57
17	392	133	124	209	332	418	830	2,160	2,420	545	124	57
18	392	133	115	187	287	445	740	2,160	2,290	445	121	57
19	354	133	121	217	310	478	740	1,680	2,160	418	110	52
20	305	121	118	209	970	445	830	1,460	2,040	365	112	50
21	292	121	118	190	2,690	478	930	1,400	1,920	340	98	50
22	278	115	118	190	2,830	445	1,240	1,460	1,800	340	95	50
23	256	115	133	183	1,680	445	1,240	1,460	1,570	295	86	50
24	217	121	3,280	190	1,300	478	1,570	1,400	1,570	295	75	50
25	209	115	509	230	1,920	545	1,920	1,300	1,400	255	81	50
26	213	118	338	230	1,030	700	2,040	1,180	1,350	275	86	50
27	179	115	287	230	930	785	2,040	1,350	1,240	247	81	50
28	172	115	296	234	660	1,030	1,680	1,570	1,130	240	68	48
29	165	110	287	230	.....	1,240	1,460	1,460	1,130	217	75	47
30	155	110	256	243	.....	1,080	1,300	1,680	1,030	217	72	50
31	152	.....	256	230	.....	830	.....	1,680	.....	225	68	.....

Monthly discharge of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1,020	152	319	0.613	0.71	19,600
November	209	110	145	.279	.31	8,630
December	3,280	105	283	.544	.63	17,400
January	1,260	183	279	.537	.62	17,200
February	2,830	217	690	1.33	1.38	38,300
March	1,240	418	580	1.12	1.29	35,700
April	2,040	580	1,190	2.29	2.56	70,800
May	2,290	1,180	1,660	3.19	3.68	102,000
June	2,830	1,030	2,010	3.87	4.32	120,000
July	930	217	497	.956	1.10	30,600
August	244	68	128	.246	.28	7,870
September	68	47	56.6	.109	.12	3,370
The year	3,280	47	651	1.25	17.00	471,000

103503°—20—WSP 461——8

NORTH FORK OF KAWEAH RIVER AT KAWEAH, CALIF.

LOCATION.—In the SW. ¼ sec. 2, T. 17 S., R. 28 E., at highway bridge in Sequoia National Forest, about half a mile north of Kaweah, Tulare County, and 2 miles above junction with Kaweah River. Manikin Creek enters one-fourth mile below and Sheep Creek 2½ miles above gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1910, to September 30, 1917.

GAGE.—Staff gage in two sections on right bank; low-water section is inclined and fastened to abutment of bridge; upper section is vertical and fastened to sycamore tree 20 feet below bridge. Previous to flood in January, 1914, gage was vertical staff fastened to right abutment. Original datum has been maintained. Gage read by J. T. Weckert.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Solid rock and sand; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet, night of February 21 (discharge, from extension of rating curve, 3,050 second-feet); minimum stage recorded, 0.6 foot September 19-20 (discharge, 5.0 second-feet).

1910–1917: Maximum stage recorded, 10.2 feet at 7 p. m. January 25, 1914 (discharge, from extension of rating curve, 7,400 second-feet); minimum stage 0.35 foot, August 27, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—Approximately 20 second-feet is diverted by several small ditches for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed October 3. Rating curve before change, fairly well defined; curve used after change, well defined between 2 and 600 second-feet, extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good below 600 second-feet and fair above.

Discharge measurements of North Fork of Kaweah River at Kaweah, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	Charles Leidl	1.09	25	June 1	Charles Leidl	2.35	257
Dec. 4	J. F. Kunesh	1.31	41	14	do	2.20	210
4	do	1.31	42	July 18	do	1.22	35
Apr. 8	Charles Leidl	2.82	464				

Daily discharge, in second-feet, of North Fork of Kaweah River at Kaweah, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	21	24	61	61	228	238	360	262	63	20	8.5
2	376	20	24	56	61	206	232	360	262	61	18	8.0
3	630	19	24	280	67	182	219	320	262	56	18	8.0
4	51	18	24	134	70	177	252	360	262	52	16	7.5
5	46	25	24	108	74	179	340	455	270	51	16	7.0
6	51	27	25	85	79	177	405	540	273	50	15	7.0
7	63	28	26	69	85	182	430	405	280	49	14	7.0
8	58	29	25	67	93	188	430	382	300	48	13	6.5
9	53	27	25	66	88	235	340	360	288	47	13	6.5
10	51	27	25	69	85	182	312	382	280	46	13	6.0
11	48	26	26	70	85	166	280	405	273	44	12	6.0
12	44	26	26	71	82	153	312	405	245	42	13	6.0
13	44	25	26	73	77	146	316	430	232	39	12	5.5
14	43	24	26	71	73	139	360	382	206	38	12	5.5
15	42	24	26	73	69	134	320	360	191	37	12	5.5
16	33	24	26	58	70	144	312	360	197	34	13	5.5
17	30	24	26	56	122	134	238	340	174	33	12	5.0
18	27	23	26	55	85	141	215	360	168	32	11	5.0
19	25	23	26	53	108	153	212	360	163	30	11	5.0
20	25	23	26	51	320	166	206	320	155	28	11	5.0
21	24	23	26	49	1,120	155	262	312	144	27	11	5.0
22	25	22	26	48	1,090	155	292	304	128	25	10	5.0
23	26	22	132	47	662	148	296	288	120	23	10	5.0
24	28	21	1,050	47	482	146	340	280	112	22	10	5.0
25	26	51	112	51	695	153	482	245	104	22	9.5	5.5
26	25	21	73	57	430	238	510	256	99	22	9.5	5.5
27	24	22	63	61	340	262	510	262	93	22	9.5	5.5
28	24	22	61	63	266	320	455	273	90	22	9.0	5.5
29	24	23	52	62	.....	360	455	245	83	21	8.5	6.0
30	22	23	51	63	.....	340	430	280	77	21	8.5	6.0
31	21	.....	63	62	.....	273	.....	252	.....	20	8.5	.....

Monthly discharge of North Fork of Kaweah River at Kaweah, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	630	21	66.5	4,090
November	51	18	24.4	1,450
December	1,050	24	71.5	4,400
January	280	47	72.1	4,430
February	1,120	61	248	13,800
March	360	134	192	11,800
April	510	206	333	19,800
May	540	245	343	21,100
June	300	77	193	11,500
July	63	20	36.4	2,240
August	20	8.5	12.2	750
September	8.5	5.0	6.00	357
The year	1,120	5.0	132	95,700

SOUTH FORK OF KAWEAH RIVER NEAR THREE RIVERS, CALIF.

LOCATION.—In SE. ¼ sec. 8, T. 18 S., R. 29 E., on Mehrten ranch, 500 feet above mouth of Cinnamon Creek, 4½ miles southeast of Three Rivers, Tulare County, and about 5 miles above junction with Kaweah River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1911, to September 30, 1917.

GAGE.—Vertical staff fastened to large boulder on right bank; read by D. N. Mehrten.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; rough and fairly permanent. Banks subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet at 5.15 a. m. June 6 (discharge, 750 second-feet); minimum stage recorded, 1.85 feet September 17–22, 25, 26, 28 (discharge, 7.4 second-feet).

1911–1917: Maximum stage recorded, 6.3 feet at 7.45 a. m., January 17, 1916 (discharge, from extension of rating curve, about 1,880 second-feet); minimum stage recorded, 1.82 feet at 7.15 a. m., October 1, 1912 (discharge, 3.3 second-feet).

DIVERSIONS.—Two small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood of February 22. Rating curve used before change fairly well defined between 15 and 800 second-feet and extended above. Rating curve used after change well defined below 500 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of South Fork of Kaweah River near Three Rivers, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	Charles Leidl	2.33	26	June 1	Charles Leidl	3.70	256
Dec. 4	Joseph F. Kunesh	2.30	25	14	do	3.75	264
4	do	2.30	24	July 18	do	2.53	37
Apr. 8	Charles Leidl	3.40	153				

Daily discharge, in second-feet, of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	22	16	85	27	122	90	124	305	97	20	16
2	25	22	16	85	26	114	97	146	345	90	20	16
3	39	21	17	122	26	122	100	166	353	82	20	16
4	33	20	18	112	26	120	106	178	365	69	20	15
5	30	20	18	85	27	124	111	202	460	76	19	14
6	39	20	18	64	28	130	114	274	750	69	18	14
7	36	20	18	54	28	124	120	313	410	64	17	13
8	33	20	18	49	28	114	124	208	410	58	16	12
9	33	20	18	42	29	97	134	234	435	54	15	11
10	39	20	18	32	30	76	139	227	410	41	14	11
11	38	20	18	33	30	64	144	243	325	41	14	10
12	38	19	18	35	30	58	151	274	285	43	13	9
13	38	19	18	36	30	54	151	297	285	45	13	8.5
14	38	19	18	36	30	82	146	337	268	45	13	8.5
15	38	19	18	36	30	49	146	365	305	43	13	8.5
16	37	19	18	38	30	45	158	365	325	43	13	8
17	37	19	18	22	36	38	166	353	313	41	13	7.5
18	37	19	18	25	33	32	180	305	297	37	13	7.5
19	36	20	18	25	36	28	186	268	268	35	13	7.5
20	34	20	18	28	74	28	202	234	234	32	13	7.5
21	33	20	18	28	78	35	217	186	217	30	13	7.5
22	31	20	18	26	490	38	234	234	208	29	13	7.5
23	31	20	20	25	240	45	250	250	198	28	13	8
24	31	20	490	26	208	49	250	195	195	26	12	7.5
25	30	20	285	28	195	58	250	166	186	25	12	7.5
26	28	20	158	28	178	76	257	141	172	24	12	7.5
27	26	20	112	28	151	90	268	208	158	22	12	7.5
28	25	20	85	28	134	106	202	217	146	21	12	7.5
29	25	20	30	28	.....	97	178	234	130	21	12	7.5
30	25	16	29	28	.....	94	146	250	114	20	16	7.5
31	22	.....	28	28	.....	90	.....	285	.....	20	16	.....

Monthly discharge of South Fork of Kaweah River near Three Rivers, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	39	16	32.3	1,990
November	22	16	19.8	1,180
December	490	16	52.5	3,230
January	122	22	43.4	2,670
February	490	26	82.4	4,580
March	130	28	77.4	4,760
April	268	90	167	9,940
May	365	124	241	14,800
June	750	114	296	17,600
July	97	20	44.2	2,720
August	20	12	14.6	898
September	16	7.5	9.87	587
The year	750	7.5	89.8	65,000

KINGS RIVER NEAR SANGER, CALIF.

LOCATION.—In NW. ¼ sec. 8, T. 13 S., R. 24 E., about half a mile below new highway bridge at Piedra, near mouth of canyon, southwest of Red Mountain, and about 12 miles northeast of Sanger, Fresno County.

DRAINAGE AREA.—1,740 square miles.

RECORDS AVAILABLE.—September 3, 1895, to September 30, 1917.

GAGE.—United States Weather Bureau inclined staff on left bank opposite original gage; read by C. D. Moore. Original gage was inclined staff on right bank. From April 18, 1903 to January 26, 1914, Friez water-stage recorder on right bank was in operation. Flood of latter date destroyed recorder. Record from present gage began January 30, 1914. Same datum for all gages.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift slightly during high water. Neither bank subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.2 feet at 5 p. m. February 22 (discharge, 17,900 second-feet); minimum stage recorded, 3.7 feet September 20–22, 24, 25 (discharge, 185 second-feet).

1895–1917: Maximum stage recorded, 21.8 feet during night of January 25, 1914, determined by leveling from flood marks (discharge from extension of rating curve, 59,700 second-feet); minimum stage recorded, 3.7 feet January 21, 1904 (discharge, 130 second-feet).

DIVERSIONS.—Several miles above the station there is a small diversion for a flume used to float lumber to Sanger.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood of February 22, 1917. Rating curve used until February 22 well defined between 400 and 18,000 second-feet; curve used after that date well defined between 150 and 18,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Kings River near Sanger, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	Charles Leidl	5.10	951	May 28	Charles Leidl	9.33	6,010
Dec. 3	J. F. Kunesh	4.55	570	July 22	do	6.85	2,550
3	do	4.58	610	Aug. 5	do	5.64	1,330
Apr. 5	Charles Leidl	7.26	2,880				

Daily discharge, in second-feet, of Kings River near Sanger, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	740	775	518	605	518	2,120	2,770	5,130	8,150	4,968	1,470	490
2	1,190	705	490	605	490	1,920	2,440	5,130	9,150	4,800	1,470	462
3	2,420	545	670	3,690	490	1,820	2,220	4,960	10,300	4,960	1,640	462
4	2,000	462	705	2,310	490	1,470	2,220	6,330	9,700	4,800	1,470	462
5	1,800	740	605	950	518	1,390	3,010	6,990	9,150	4,960	1,390	435
6	1,430	638	575	740	545	1,310	3,660	7,650	8,900	4,650	1,310	435
7	1,110	775	545	575	518	1,310	4,220	7,650	10,300	4,500	1,230	435
8	1,030	845	518	518	705	1,310	5,130	6,330	11,500	4,360	1,160	435
9	1,030	880	490	490	740	1,160	4,220	5,500	13,200	3,660	1,020	410
10	1,110	845	490	462	705	1,470	3,400	5,500	12,800	3,400	1,020	410
11	1,190	670	545	490	670	1,230	2,890	6,770	10,900	3,270	1,020	360
12	1,350	880	518	490	670	1,160	3,400	6,330	10,300	3,270	950	312
13	1,350	705	490	518	638	1,310	3,940	8,400	10,600	3,400	1,020	290
14	1,430	670	462	545	605	1,550	3,400	9,400	11,800	3,400	1,020	290
15	1,110	638	462	575	638	880	2,890	9,700	12,800	3,400	1,090	268
16	1,030	605	435	518	705	1,230	2,770	9,150	12,500	3,660	1,160	268
17	1,030	605	435	490	775	1,160	2,440	8,650	12,100	3,660	1,020	245
18	1,030	638	490	435	845	1,020	2,220	7,650	12,500	2,890	950	245
19	1,030	740	462	435	880	1,020	2,220	6,330	11,800	2,660	880	245
20	1,030	638	435	490	4,080	880	2,220	5,130	10,900	2,660	880	188
21	1,030	605	435	545	7,650	950	2,660	4,960	10,000	2,440	775	170
22	1,030	575	410	518	9,400	950	3,800	5,910	9,150	2,440	705	152
23	1,030	545	605	518	7,900	1,020	4,220	6,120	8,650	2,120	638	135
24	950	545	4,500	490	3,660	880	5,500	5,130	8,150	2,120	638	170
25	775	490	1,190	490	6,770	1,310	6,990	4,960	7,430	1,920	638	170
26	740	490	605	545	3,940	1,310	7,900	4,500	7,210	1,820	705	205
27	638	490	575	490	3,140	2,020	7,650	5,130	6,770	1,920	638	205
28	670	490	740	490	2,330	2,770	5,910	6,120	6,550	1,820	575	205
29	775	518	605	545	.....	3,270	4,960	5,500	6,120	1,640	575	205
30	880	490	518	575	.....	2,890	4,500	7,210	5,130	1,550	545	205
31	810	.....	545	545	.....	2,550	.....	7,650	.....	1,470	518	.....

Monthly discharge of Kings River near Sanger, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,420	638	1,120	0.644	0.74	68,900
November	880	490	641	.368	.41	38,100
December	4,500	410	680	.391	.45	41,800
January	3,690	435	699	.402	.46	43,000
February	9,400	490	2,180	1.25	1.30	121,000
March	3,270	880	1,500	.862	.99	92,200
April	7,900	2,220	3,860	2.22	2.48	230,000
May	9,700	4,500	6,510	3.74	4.31	400,000
June	13,200	5,130	9,820	5.64	6.29	584,000
July	4,960	1,470	3,180	1.83	2.11	196,000
August	1,640	518	972	.559	.64	59,800
September	490	135	299	.172	.19	17,800
The year	13,200	135	2,610	1.50	20.37	1,890,000

SAN JOAQUIN RIVER BASIN.

SAN JOAQUIN RIVER AND TRIBUTARIES ABOVE KINGS RIVER.

SAN JOAQUIN RIVER NEAR FRIANT, CALIF.

LOCATION.—In NW. ¼ sec. 5, T. 11 S., R. 21 E., about 1½ miles northeast of Friant, Fresno County.

DRAINAGE AREA.—1,640 square miles at old site 2 miles upstream.

RECORDS AVAILABLE.—October 18, 1907, to September 30, 1917.

GAGE.—Gurley weight-driven printing water-stage recorder on left bank, installed December 9, 1913. Previous to that date the gage was a staff gage on left bank in the SE. ¼ sec. 34, T. 10 S., R. 21 E., about 4 miles northeast of Friant. Relation between old datum and new datum unknown.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed is sand and gravel. Control is a solid rock dike about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 13.25 feet at 8.30 a. m. June 4, 10, and 17 (discharge, 15,600 second-feet); minimum stage, from water-stage recorder, 3.88 feet from 1 to 3 a. m. September 17 (discharge 394 second-feet).

1907–1917: Maximum stage recorded, 21.72 feet at 11.30 p. m. January 25, 1914 (discharge, 46,200 second-feet); minimum stage recorded, 3.25 feet October 17–19 and 22–29, 1913 (discharge, 170 second-feet).

DIVERSIONS.—Fresno Flume & Lumber Co. diverts about 10 second-feet from Stevenson Creek. This water is used for irrigation near Clovis.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 240 and 18,000 second-feet and is an extension above. Operation of water-stage recorder satisfactory throughout year except during part of September, when clock stopped. Mean daily gage height determined by averaging readings printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of San Joaquin River near Friant, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 22	J. F. Kunesh	4.57	668	June 2	Charles Leidl	11.44	10,600
Apr. 4	Charles Leidl	6.46	1,900	12	do	11.65	11,400
9	do	8.78	4,440	15	do	12.49	13,200
May 27	do	9.06	5,030	July 21	do	7.47	2,760
27	do	9.12	5,030	22	do	7.45	2,760
June 2	do	11.42	10,500	23	do	6.33	1,740

Daily discharge, in second-feet, of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	530	690	506	822	690	2,240	2,120	4,370	8,420	5,490	1,690	740
2	1,440	690	590	795	690	2,080	1,960	4,370	9,400	5,490	1,800	740
3	1,800	690	715	1,690	690	1,840	1,920	4,290	10,200	5,490	1,800	640
4	1,340	715	740	1,170	690	1,690	2,080	5,090	9,900	5,290	1,730	690
5	1,140	740	850	932	665	1,730	2,750	5,910	9,650	5,290	1,620	690
6	1,110	740	878	850	768	1,730	3,700	6,560	8,900	5,490	1,500	715
7	1,110	690	878	795	795	1,690	4,210	7,240	9,650	5,090	1,470	795
8	1,050	795	690	715	795	1,690	5,090	5,910	11,500	4,900	1,370	768
9	960	740	690	768	795	1,840	4,540	5,700	13,100	4,460	1,300	740
10	1,050	768	690	768	822	1,960	3,500	5,700	13,400	3,830	1,270	636
11	1,050	795	577	768	822	1,620	3,080	6,780	10,900	3,630	1,140	640
12	1,020	795	795	795	740	1,440	3,260	6,120	10,200	3,630	1,110	640
13	1,050	690	768	795	768	1,370	4,050	7,470	10,200	3,700	1,270	613
14	1,020	640	690	768	768	1,470	3,760	8,900	10,700	3,630	1,240	613
15	1,050	622	665	690	740	1,370	3,260	8,660	11,500	3,760	1,240	595
16	1,080	640	636	715	715	1,270	2,860	7,940	11,500	4,050	1,200	554
17	1,170	640	613	608	740	1,240	2,600	7,700	11,500	4,050	1,240	522
18	1,300	626	554	631	795	1,270	2,330	6,780	11,700	3,560	1,140	550
19	1,270	618	613	690	740	1,340	2,200	6,340	10,900	3,260	1,080	559
20	1,140	559	608	715	3,300	1,340	2,280	4,630	10,700	3,020	990	559
21	1,110	582	626	715	11,700	1,440	2,650	4,370	9,900	2,860	960	550
22	1,080	564	613	604	8,900	1,470	3,500	5,290	9,400	2,700	905	550
23	990	586	636	665	6,780	1,370	3,830	5,700	8,900	2,560	878	542
24	960	582	1,370	640	4,050	1,340	4,720	5,700	8,660	2,420	878	494
25	878	590	1,240	665	7,010	1,440	6,340	5,090	7,700	2,240	850	522
26	822	554	715	665	4,050	1,690	7,700	4,370	7,240	2,200	905	522
27	795	518	715	690	2,800	1,960	7,700	4,720	7,010	2,160	878	510
28	795	608	715	715	2,510	2,460	6,560	5,700	7,010	2,120	850	500
29	768	586	768	640	.....	3,140	5,090	5,700	6,560	2,000	822	500
30	690	572	850	715	.....	3,080	4,210	7,010	5,700	1,880	795	500
31	715	.....	822	740	.....	2,510	.....	7,940	.....	1,730	768	.....

NOTE.—No record, clock stopped, Sept. 28-30; discharge estimated.

Monthly discharge of San Joaquin River near Friant, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,800	530	1,040	63,900
November	795	518	654	38,900
December	1,370	506	736	45,300
January	1,690	604	772	47,500
February	11,700	665	2,330	129,000
March	3,140	1,240	1,750	108,000
April	7,700	1,920	3,800	226,000
May	8,900	4,290	6,070	373,000
June	13,400	5,700	9,730	579,000
July	5,490	1,730	3,610	222,000
August	1,800	768	1,180	72,600
September	795	500	606	36,100
The year	13,400	500	2,680	1,940,000

SAN JOAQUIN RIVER NEAR NEWMAN, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 7 S., R. 9 E., at drawbridge on Hill's ferry road, 300 feet below mouth of Merced River and 3½ miles northeast of Newman, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1912, to September 30, 1917.

GAGE.—Vertical staff fastened to upstream side of downstream support of draw span, 60 feet below the bridge in the middle of the stream. Read by Rasmus Lorensen.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and small gravel which shift during high water. Both banks subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.3 feet February 26 and June 19–20 (discharge, 10,800 second-feet); minimum stage recorded, 1.78 feet September 29–30 (discharge, 143 second-feet).

1912–1917: Maximum stage recorded, 18.0 feet at 9 a. m. January 27, 1914 (discharge, 20,700 second-feet); minimum stage recorded, 1.0 foot October 5 and 8 to 18, 1913 (discharge, 50 second-feet).

DIVERSIONS.—Practically the entire low-water flow of main river and tributaries is diverted for irrigation; low-water records show amount of return water.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Stage-discharge relation for low water changed October 4, January 4 and February 26; rating curves before and after changes fairly well defined and merge into one at stage of 10 feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of San Joaquin River near Newman, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	Charles Leidl	3.50	910	Jan. 23	Joseph F. Kunesh	4.50	1,640
Dec. 2	Joseph F. Kunesh	3.22	799	Aug. 6	Charles Leidl	3.47	496

Daily discharge, in second-feet, of San Joaquin River near Newman, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	218	1,060	780	1,920	1,580	12,800	1,960	5,490	7,040	12,200	720	192
2	242	1,060	780	1,860	1,580	12,400	1,960	5,740	7,720	11,900	630	192
3	230	1,010	870	2,120	1,460	12,200	1,890	5,490	8,450	11,300	590	185
4	960	960	960	3,640	1,460	11,500	1,820	4,550	9,210	10,700	550	185
5	915	915	1,320	3,720	1,460	10,500	1,540	3,900	9,690	9,690	550	185
6	825	915	1,380	3,480	1,460	9,050	1,280	4,330	9,690	8,300	475	185
7	740	960	1,260	3,400	1,460	7,720	1,410	4,890	10,000	6,390	440	200
8	780	915	1,380	3,400	1,460	6,130	1,610	5,490	10,800	5,130	440	200
9	870	870	1,260	3,240	1,460	4,550	2,040	5,610	11,700	4,550	675	192
10	870	915	1,110	3,000	1,400	3,900	2,960	5,740	12,400	4,330	380	192
11	870	915	1,160	2,700	1,460	3,900	3,050	6,260	13,200	4,110	355	185
12	870	915	1,260	2,420	1,300	3,700	3,050	6,780	12,800	3,800	355	185
13	870	960	1,260	2,140	1,250	3,500	3,050	6,910	12,400	3,320	330	185
14	870	960	1,110	2,280	1,250	3,410	2,780	7,440	12,400	2,870	318	185
15	915	1,010	1,210	2,350	1,250	3,410	2,600	8,150	13,000	2,520	305	178
16	1,010	960	1,260	2,140	1,250	3,320	2,440	8,450	13,600	2,440	305	170
17	960	960	1,160	1,820	1,250	2,870	2,520	8,150	14,000	2,360	368	178
18	1,060	960	1,060	1,580	1,200	2,690	2,440	8,150	14,400	2,520	330	170
19	1,060	960	1,060	1,580	1,300	2,440	2,280	8,150	14,600	2,690	305	170
20	1,060	960	1,060	1,580	1,350	2,120	2,040	7,860	14,600	2,360	285	170
21	1,160	960	1,010	1,700	2,280	2,040	1,540	7,720	14,400	2,280	275	170
22	1,160	915	960	1,700	8,450	1,890	1,410	7,720	14,200	2,120	265	170
23	1,210	870	1,010	1,640	13,200	1,750	1,340	7,860	14,000	1,960	255	170
24	1,260	870	1,110	1,640	13,800	1,750	1,540	8,150	13,600	1,820	238	170
25	1,260	825	1,480	1,640	13,200	1,680	2,780	7,580	13,400	1,680	255	155
26	1,210	870	1,980	1,760	14,600	1,540	3,320	6,780	13,200	1,540	230	155
27	1,210	780	1,790	1,760	14,000	1,610	4,330	6,390	13,000	1,340	222	155
28	1,160	780	1,860	1,760	13,200	1,540	4,890	6,260	12,800	1,160	208	145
29	1,160	780	2,050	1,760	.....	1,540	5,490	6,000	12,800	1,040	208	145
30	1,160	780	2,260	1,640	.....	1,750	5,610	6,260	12,600	925	200	145
31	1,110	.....	2,120	1,580	.....	1,890	.....	6,260	.....	820	200	.....

Monthly discharge of San Joaquin River, near Newman, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,260	218	944	58,000
November	1,060	780	919	54,700
December	2,260	780	1,300	79,900
January	3,720	1,580	2,220	137,000
February	14,600	1,200	4,300	239,000
March	12,800	1,540	4,550	280,000
April	5,610	1,280	2,570	153,000
May	8,450	3,900	6,600	406,000
June	14,600	7,040	12,200	726,000
July	12,200	820	4,200	258,000
August	720	200	363	22,300
September	200	145	175	10,400
The year	14,600	145	3,350	2,420,000

STEVENSON CREEK AT SHAVER, CALIF.

LOCATION.—Three-fourths mile below Shaver Lake dam and three-fourths mile west of Shaver, Fresno County.

DRAINAGE AREA.—30.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1916, to September 30, 1917.

GAGE.—Lietz water-stage recorder on right bank about 50 feet above weir. Zero of gage set at elevation of crest of low-water weir.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and bedrock. Control is a compound weir consisting of a 64-foot rectangular sharp-crested weir with end contractions practically suppressed and an 8-foot rectangular sharp-crested weir 1 foot deep in middle for low flow. Weir is very satisfactorily installed and leakage is very small.

ICE.—Considerable ice forms at the station but it is unlikely that stage-discharge relation is ever affected by it.

DIVERSIONS.—Fresno Flume & Lumber Co.'s two flumes divert water at Shaver Lake dam. This water is used for transporting lumber and is not returned to stream but conveyed to Clovis and there used for irrigation.

REGULATION.—During dry season entire flow is regulated at Shaver Lake dam. Capacity of Shaver Lake reservoir is 4,880 acre-feet (reported by I. B. Bennett).

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 800 second-feet and extended above. Daily discharge ascertained with a discharge integrator. Records excellent.

COOPERATION.—Stage record furnished by Fresno Flume & Lumber Co., through I. B. Bennett, president.

Discharge measurements of Stevenson Creek at Shaver, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 1	0.51	9.5	Aug. 2	2.18	345	Aug. 2	1.16	44
2	2.16	336	2	2.16	321	3	.76	16.3
2	2.14	315	2	1.41	100			

Daily discharge, in second-feet, of Stevenson Creek at Shaver, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.8	11	9.5	9.5	13	114	170	197	84	12	12	5.6
2	10	11	9.3	9.7	13	118	168	214	78	12	149	5.4
3	8.8	11	9.5	9.7	13	113	178	211	80	11	11	6.0
4	9.2	11	9.5	9.8	13	107	217	212	82	11	6.6	5.9
5	9.8	10	9.5	10	15	106	234	365	83	10	6.3	5.6
6	10	10	9.2	11	16	112	243	456	83	9.6	5.5	5.4
7	8.8	11	9.2	11	21	116	260	280	83	9.2	5.0	5.4
8	9.5	11	9.3	11	25	127	275	62	84	9.2	5.4	5.1
9	9.6	11	10	11	26	129	306	141	89	9.2	7.8	5.5
10	9.6	11	10	11	26	117	330	258	90	9.1	5.5	5.3
11	9.5	10	85	11	26	127	398	326	90	9.2	4.8	5.5
12	9.8	9.8	43	11	26	131	345	309	89	9.5	5.5	5.2
13	9.8	9.8	17	10	26	133	296	310	88	10	5.4	4.9
14	9.9	9.5	13	10	26	149	269	302	83	10	5.3	5.4
15	10	9.5	11	10	26	146	265	275	74	13	5.0	5.5
16	9.8	10	11	10	26	142	262	270	70	15	5.3	5.5
17	9.5	10	11	10	26	141	246	270	40	15	5.3	5.7
18	9.8	11	11	9.8	26	146	218	270	24	11	5.2	5.7
19	9.8	10	10	9.8	25	147	209	97	22	12	5.5	5.3
20	9.8	10	9.5	9.8	24	145	198	46	21	11	4.9	4.6
21	9.8	10	9.2	9.8	24	141	195	178	21	9.3	4.8	4.8
22	10	10	8.7	10	24	140	267	110	20	7.9	4.8	5.2
23	10	10	8.0	11	25	137	235	136	19	7.4	5.4	4.9
24	10	10	8.0	12	26	142	39	141	18	7.8	5.6	5.0
25	10	10	8.0	12	35	152	203	140	16	7.6	5.9	5.7
26	10	9.5	8.0	12	53	175	341	100	13	7.1	5.4	5.6
27	10	9.5	8.0	13	81	193	307	100	13	6.4	5.4	5.0
28	10	9.2	8.0	13	106	220	261	101	15	7.5	5.3	5.6
29	10	9.5	7.8	13	.....	267	217	101	13	6.6	5.4	5.3
30	10	9.5	7.8	13	.....	242	190	94	12	6.6	5.3	5.2
31	11	.....	8.1	13	.....	190	.....	78	.....	6.9	5.4	.....

Monthly discharge of Stevenson Creek at Shaver, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	11	8.8	9.76	600
November	11	9.2	10.2	607
December	85	7.8	13.1	806
January	13	9.5	10.9	670
February	106	13	29.0	1,610
March	267	106	147	9,040
April	398	39	245	14,600
May	456	46	198	12,200
June	90	12	53.2	3,170
July	15	6.4	9.65	593
August	149	4.8	10.5	646
September	6.0	4.6	5.36	319
The year	456	4.6	61.9	44,900

FRESNO FLUME & LUMBER CO.'S UPPER FLUME AT SHAVER, CALIF.

LOCATION.—About 75 feet below intake at Shaver Lake dam at Shaver, Fresno County.

RECORDS AVAILABLE.—November 13, 1915, to September 30, 1917.

GAGE.—Lietz water-stage recorder with its zero set at same elevation as crest of weir.

DISCHARGE MEASUREMENTS.—The weir was rated by discharge measurements made from foot plank a short distance below.

CHANNEL AND CONTROL.—Channel is rectangular timber flume; control is 2½-foot rectangular weir with steel crest.

ICE.—Considerable ice and snow accumulate in flume during winter. Flume not in use during this period.

ACCURACY.—Stage-discharge relation changed, probably after December 30. Two well-defined rating curves were used October 1 to December 30 and May 18 to September 30. Mean daily gage height obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily-gage height to rating tables; hourly discharge averaged for days when there was much change in stage and when flume was dry for part of the day. Records good.

COOPERATION.—Stage record furnished by Fresno Flume & Lumber Co.

The flume is used for transporting lumber about the yard at mill. The water is then wasted into lower flume. There is a slight leakage in flume which is returned to Stevenson Creek above gaging station at Shaver.

Discharge measurements of Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec-ft.*		*Feet.*	*Sec-ft.*		*Feet.*	*Sec-ft.*
Aug. 1	0.77	6.0	Aug. 1	.99	8.5	Aug. 3	.35	2.0
1	1.18	11.0	1	.54	3.5			

Daily discharge, in second-feet, of Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1	2.8	4.2	3.6	.....	1.6	2.4	5.1	6.2
2	.....	4.2	3.7	.....	1.6	1.6	.....	6.2
3	.....	4.2	3.7	.....	1.6	.....	4.1	6.2
4	1.1	4.2	3.7	.....	1.7	.....	6.5	6.2
5	1.5	4.2	3.7	.....	1.9	.....	6.2	6.2
6	1.5	4.2	3.8	.....	1.9	.....	6.4	6.1
7	3.5	4.2	3.8	.....	2.1	.....	6.5	6.1
8	4.6	4.2	3.8	.....	2.3	1.5	6.5	6.1
9	4.6	4.2	3.8	.....	2.4	4.1	6.5	6.1
10	4.6	4.2	3.7	.....	2.4	4.2	6.4	6.1
11	4.6	4.2	3.6	.....	2.4	4.2	6.2	6.1
12	4.6	4.2	3.3	.....	2.4	4.2	6.2	6.1
13	4.6	4.2	3.2	.....	2.4	4.2	6.2	6.1
14	4.6	4.2	3.0	.....	2.4	4.1	6.2	6.1
15	4.6	4.2	3.0	.....	2.4	4.1	6.2	6.1
16	4.6	4.2	3.0	.....	2.4	4.1	6.2	6.1
17	4.6	4.2	3.0	.....	2.4	4.1	6.2	6.1
18	4.5	4.0	3.0	1.0	2.4	4.2	6.2	6.1
19	4.6	3.8	3.0	1.6	2.4	4.3	6.2	6.1
20	4.6	3.8	2.3	1.7	2.4	4.3	6.2	6.1
21	4.6	3.8	1.3	1.7	2.4	4.6	6.2	6.1
22	4.6	3.8	1.3	1.7	2.4	5.2	6.2	6.0
23	4.6	3.8	1.3	1.8	.2	5.2	6.2	5.8
24	4.6	3.7	1.3	1.8	.....	4.4	6.2	5.8
25	4.6	3.7	1.3	1.7	.....	3.7	6.2	5.8
26	4.6	3.7	1.3	1.7	.....	3.7	6.2	5.7
27	4.5	3.7	1.3	1.7	1.2	3.7	6.2	5.5
28	4.3	3.7	1.3	1.7	2.4	3.7	6.2	5.4
29	4.2	3.7	1.3	1.7	2.4	.5	6.2	5.2
30	4.2	3.7	.5	1.6	2.4	.....	6.2	5.2
31	4.2	.....	.0	1.6	.....	1.4	6.2	.....

NOTE.—Flume dry on days for which no discharge is given.

Monthly discharge of Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	4.6	0.0	3.84	236
November	4.2	3.7	4.01	239
December	3.8	.0	2.58	159
January	.0	.0	.0	0
February	.0	.0	.0	0
March	.0	.0	.0	0
April	.0	.0	.0	0
May	1.8	.0	.74	46
June	2.4	.0	1.90	113
July	5.2	.0	2.96	182
August	6.5	.0	5.95	366
September	6.2	5.2	5.97	355
The year	6.5	.0	2.34	1,700

FRESNO FLUME & LUMBER CO.'S LOWER FLUME AT SHAVER, CALIF.

LOCATION.—About 75 feet below intake at Shaver Lake dam at Shaver, Fresno County.

RECORDS AVAILABLE.—January 6, 1916, to September 30, 1917.

GAGE.—Lietz water-stage recorder; zero at elevation of crest of weir.

DISCHARGE MEASUREMENTS.—The weir was rated by discharge measurements made from foot plank a short distance below.

CHANNEL AND CONTROL.—Channel is rectangular timber flume; control is an 8-foot rectangular weir with steel crest.

ICE.—Considerable ice and snow accumulate in flume during the winter when water is not running.

ACCURACY.—Stage-discharge relation changed, probably after December 30, when flume was not in use. Two well-defined rating curves were used, one applicable October 1 to December 30, the other February 9 to September 30. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph; hourly discharge averaged for days when there was much change in stage. Records good.

COOPERATION.—Record of stage furnished by Fresno Flume & Lumber Co.

The water is used for transporting lumber from mill to Clovis, and is then used for irrigation.

Discharge measurements of Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 1	0.48	7.3	Aug. 3	.28	3.5
1	.80	17.4	3	.63	12.1

Daily discharge, in second-feet, of Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.1	15.7	15.4	.....	14.0	14.0	16.1	17.2	14.4	.....	9.2
2	.....	15.7	15.4	.....	14.0	14.0	16.1	17.2	9.6	10.4	12.8
3	.....	15.7	15.4	.....	14.0	14.0	16.1	17.2	.....	10.9	12.8
4	8.6	15.4	15.4	.....	14.0	14.0	16.1	17.2	.....	16.1	12.8
5	12.2	15.4	15.4	.....	14.0	14.0	16.1	16.8	.....	15.8	12.5
6	12.2	15.4	15.4	.....	14.0	14.0	16.1	16.8	2.8	7.9	2.9
7	12.2	15.4	15.4	.....	14.0	14.0	16.1	16.8	2.3	6.8	8.8
8	12.2	15.4	15.4	.....	14.0	14.0	16.4	16.8	5.5	6.7	17.5
9	12.2	15.4	13.8	10.2	14.0	14.0	16.8	15.3	5.5	8.8	17.5
10	12.2	15.4	12.2	17.5	14.0	14.0	16.8	14.0	5.5	9.6	7.3
11	12.2	15.4	12.2	17.5	14.0	14.0	17.2	14.0	5.5	12.5	7.3
12	12.2	15.7	12.2	16.4	14.0	14.0	17.5	14.0	5.5	13.7	8.8
13	12.2	15.7	12.2	15.8	14.0	14.0	17.5	14.0	5.5	6.9	4.4
14	12.2	15.7	12.2	15.4	14.0	14.0	17.5	14.4	5.5	7.0	5.8
15	12.2	15.7	12.2	15.4	14.0	14.0	17.5	14.4	11.0	7.9	10.2
16	12.2	15.7	12.2	15.4	14.0	14.0	17.5	14.0	4.6	8.4	9.2
17	12.2	15.7	12.2	15.4	14.0	14.0	17.5	14.0	5.0	8.9	4.6
18	12.2	15.7	12.2	15.4	14.0	14.0	17.5	14.0	6.0	3.7	2.9
19	15.4	15.7	12.2	15.4	14.0	14.0	17.0	14.0	4.6	.7	1.4
20	15.4	15.7	12.2	16.1	14.0	14.0	14.2	14.0	11.0	1.4	5.8
21	15.4	15.7	12.2	16.1	14.0	14.0	18.9	14.0	9.2	.5	1.2
22	15.4	15.7	12.2	16.1	14.0	14.0	18.9	14.0	11.0	.9	10.7
23	15.4	15.7	12.2	16.1	14.0	14.4	18.9	14.0	11.0	1.3	16.1
24	15.4	15.7	12.2	16.1	14.0	14.7	19.2	14.0	12.4	8.8	7.4
25	15.4	15.7	12.2	16.1	14.0	15.4	19.2	10.5	13.4	10.6	12.1
26	15.4	15.4	12.2	16.1	14.0	15.8	18.2	.....	13.4	14.0	5.5
27	15.4	15.4	12.2	6.7	14.0	16.1	17.2	.....	13.4	14.0	6.8
28	15.7	15.4	12.2	4.7	14.0	16.1	17.2	9.3	13.7	5.8	12.1
29	15.7	15.4	12.2	.....	14.0	16.1	17.2	17.2	14.0	7.7	9.1
30	15.7	15.4	5.1	.....	14.0	16.1	17.2	15.7	5.8	9.6	5.1
31	15.7	.....	.....	.....	14.0	.....	17.2	.....	.....	7.6	.....

NOTE.—Flume dry on days for which discharge is not given.

Monthly discharge of Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	15.7	0.0	12.5	769
November	15.7	15.4	15.6	928
December	15.4	.0	12.5	769
January	.0	.0	.0	0
February	17.5	.0	10.5	583
March	14.0	14.0	14.0	861
April	16.1	14.0	14.4	857
May	19.2	16.1	17.2	1,060
June	17.2	.0	13.8	821
July	14.4	.0	7.33	451
August	16.1	.0	7.90	486
September	17.5	1.2	8.69	517
The year	19.2	.0	11.2	8,100

FRESNO RIVER BASIN.

FRESNO RIVER NEAR KNOWLES, CALIF.

LOCATION.—In N. ½ sec. 15, T. 8 S., R. 20 E., at Fresno Crossing, about 6 miles northeast of Knowles, Madera County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 16, 1911, to January 1, 1914; November 13, 1915, to September 30, 1917.

GAGE.—Vertical staff in two sections; low-water section is on left bank about 60 feet above bridge; high-water section is on right bank about 100 feet above bridge. Gage read by J. E. Gayman. There have been several changes in gage sections; original datum has probably been maintained.

DISCHARGE MEASUREMENTS.—Made from cable about 300 feet below bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders, gravel and sand, and outcroppings of bedrock; fairly permanent. A concrete control was installed November 4, 1916.

EXTREMES OF DISCHARGE.—Maximum stage recorded, during year, 6.0 feet at 5 p. m. February 21 (discharge, determined from extension of rating curve, 4,500 second-feet); minimum stage recorded, 0.64 foot at 7 a. m. September 7 (discharge, 3.8 second-feet).

1911–1914 and 1916–1917: Maximum stage recorded, February 21, 1917; minimum stage recorded, −0.20 foot, August 6–10, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Water is diverted above the station for irrigation and lumbering purposes.

REGULATIONS.—Diurnal fluctuation at low stages due to diversions above.

ACCURACY.—Stage-discharge relation was changed by construction of a concrete control on November 4. Rating curve before change well defined between 25 and 600 second-feet and extended above; curve after change well defined between 5 and 400 second-feet and extended above; curves coincide above 1,450 second-feet. Gage read to quarter-tenths once or twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent for medium and probably fair for low and extreme high stages.

Discharge measurements of Fresno River near Knowles, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 31	0.73	21	Nov. 5	1.07	31	May 26	1.45	144
Nov. 4	.90	15	Apr. 14	1.50	166	July 16	1.10	49

Daily discharge, in second-feet, of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	10	29	77	42	312	210	166	126	85	39	5
2	195	12	34	77	42	260	188	146	126	80	26	4.6
3	100	13	91	550	42	235	188	146	126	80	26	4.6
4	55	15	166	126	42	210	188	166	119	74	24	4.2
5	38	29	91	108	46	210	210	166	119	63	24	4.2
6	32	42	91	91	46	210	210	166	119	63	19	4.2
7	36	42	126	77	46	210	210	166	112	59	17	3.8
8	26	42	91	77	52	210	235	166	112	59	15	4.2
9	26	39	63	77	52	260	210	158	105	59	15	4.2
10	26	39	63	69	59	312	210	158	112	55	15	4.2
11	26	34	63	69	59	210	210	150	119	55	14	4.6
12	32	29	46	63	52	235	210	150	119	55	14	4.6
13	32	26	42	63	52	260	188	150	119	50	14	4.6
14	26	26	42	63	52	235	166	150	112	46	12	5
15	26	26	42	63	46	210	166	142	112	42	12	5
16	26	29	29	63	46	210	166	142	112	42	11	5
17	26	29	26	63	42	188	166	150	112	42	11	5
18	26	26	26	59	63	188	166	166	112	39	9.5	5.5
19	26	26	26	52	63	210	166	150	105	39	8	5.5
20	24	26	26	52	582	210	166	150	105	36	8	6
21	24	26	26	52	3,770	188	166	150	98	42	8	6
22	24	29	29	52	2,380	188	175	150	91	42	8	7
23	24	29	29	46	1,650	166	175	158	91	42	7.5	7
24	21	26	582	46	1,750	166	188	150	91	39	7.5	7
25	9	26	146	46	1,850	188	210	150	91	39	7.5	7
26	9	24	63	42	830	188	220	142	85	36	7	6
27	9	24	42	46	550	210	166	142	85	29	7	6
28	9	26	63	46	425	235	166	142	80	26	6	5.5
29	9	26	63	42	.....	235	210	134	80	26	6	5.5
30	12	26	63	42	.....	210	188	134	80	26	5.5	5
31	15	.....	63	42	.....	210	.....	134	.....	26	5	.....

NOTE.—No record Nov. 2 and 3; discharge interpolated.

Monthly discharge of Fresno River near Knowles, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	195	9	31.5	1,940
November	42	10	27.4	1,630
December	582	26	76.8	4,720
January	550	42	78.7	4,840
February	3,770	42	526	29,200
March	312	166	218	13,400
April	235	166	190	11,300
May	166	134	151	9,280
June	126	80	106	6,310
July	85	26	48.3	2,970
August	39	5	13.2	812
September	7	3.8	5.20	309
The year	3,770	3.8	120	86,700

MERCED RIVER AND TRIBUTARIES.

MERCED RIVER AT HAPPY ISLES BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Happy Isles Bridge, at power house, 1½ miles southeast of Yosemite, Mariposa County.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 23, 1915, to September 30, 1917.

GAGE.—Friez water-stage recorder in masonry well on right bank about 20 feet below bridge. Previous to November 2, 1916, record is from a staff gage fastened to downstream side of large boulder which is used for the right abutment of the bridge.

DISCHARGE MEASUREMENTS.—Made from Clark Bridge, about half a mile below gage or by wading.

CHANNEL AND CONTROL.—Boulders; considered permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.68 feet at 12.15 a. m., June 10 (discharge, 3,320 second-feet); minimum stage from water-stage recorder, 0.75 foot at noon January 14 (discharge, 22 second-feet).

1915–1917: Maximum stage recorded, 6.68 feet June 10, 1917 (discharge, 3,320 second-feet); minimum stage recorded, 1.00 foot, October 30 to November 8, 1915 (discharge, 5.5 second-feet).

ICE.—Stage-discharge relation possibly slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—Power plant above station; water returned to the river just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Daily discharge ascertained by applying mean daily gage height to rating table or by means of a discharge integrator; for periods of no record discharge estimated by comparison with records of flow at other stations in the park. Records excellent.

COOPERATION.—Gage-height record furnished by Yosemite National Park, through W. B. Lewis, superintendent.

Discharge measurements of Merced River at Happy Isles Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height in feet.		Discharge.	Date.	Made by—	Gage height in feet.		Discharge.
		Old gage.	New gage.				Old gage.	New gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Oct. 17	F. C. Ebert	2.78	2.22	225	June 8	Charles Leidl	.....	6.12	2,720
19	do	2.62	2.07	185	8	do	.....	6.05	2,680
Nov. 2	do	1.86	1.31	71	29	J. F. Kunesh	.....	4.32	1,190
Jan. 21	Charles Leidl	1.60	1.04	40	30	do	.....	4.02	1,060
Apr. 18	do	2.78	2.26	250	July 5	H. M. Stafford	.....	4.00	952
June 6	do	.....	5.21	1,840	31	H. D. McGlashan	.....	2.14	208
6	do	.....	5.12	1,750	Aug. 1	do	.....	2.78	386
7	do	.....	5.38	2,060					

Daily discharge, in second-feet, of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	145	73	39	36	44	120	178	633	1,600	1,090	377	68
2	295	66	41	29	43	117	183	593	1,850	1,080	317	68
3	295	65	50	29	45	108	175	652	1,980	1,020	253	68
4	215	60	64	29	50	102	223	812	1,920	982	247	68
5	215	66	71	29	53	98	328	960	1,890	957	230	68
6	192	78	60	32	59	100	395	1,130	2,030	958	215	72
7	192	86	57	31	60	101	495	1,200	2,380	935	200	72
8	192	85	61	27	62	102	538	943	2,670	900	190	72
9	192	90	54	26	63	100	426	1,030	2,950	732	175	70
10	192	95	52	27	62	88	348	914	2,770	578	160	68
11	204	97	52	29	63	88	357	1,190	2,030	562	145	66
12	192	76	52	29	61	89	402	1,040	1,900	607	163	58
13	215	66	52	26	58	89	400	1,380	1,970	748	168	55
14	215	65	49	25	57	89	386	1,530	2,240	779	149	53
15	215	61	47	27	55	74	324	1,400	2,570	934	146	49
16	228	58	45	45	54	75	284	1,260	2,680	1,330	161	44
17	252	54	44	48	53	76	257	1,290	2,660	1,120	142	44
18	215	51	43	45	52	84	234	1,020	2,660	800	123	43
19	192	47	43	43	55	83	235	800	2,420	612	115	43
20	172	43	44	42	51	92	265	705	2,350	539	106	42
21	172	44	42	42	38	97	285	716	2,210	455	101	41
22	154	43	36	40	48	88	428	790	1,980	394	98	38
23	136	42	38	39	73	85	572	780	1,810	360	95	38
24	128	40	39	41	100	95	770	719	1,690	312	98	38
25	104	35	40	43	128	118	1,040	602	1,550	289	97	36
26	104	41	62	46	121	151	1,130	563	1,450	297	92	34
27	97	42	67	48	125	176	1,040	787	1,430	293	90	30
28	90	40	58	46	126	241	900	991	1,440	287	84	29
29	83	39	56	47	.....	288	680	1,030	1,300	254	79	27
30	79	39	46	46	.....	242	608	1,300	1,130	228	73	27
31	76	.....	35	45	.....	195	.....	1,440	.....	224	70	

NOTE.—Gage-height record incomp'ete for following periods: Dec. 29, 30, Jan. 16–18, Feb. 13, Apr. 22–24, May 20, 21, June 13–15, Aug. 4 and 11; discharge partly estimated. Discharge, Dec. 24, and Feb. 14–17, interpolated. Discharge, Mar. 10–17 and Aug. 5–10, estimated by comparison with records of flow of Merced River at Pohono Bridge.

Monthly discharge of Merced River at Happy Isles Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1917.

(Drainage area, 181 square miles.)

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	295	76	176	0.972	1.12	10,800
November	97	35	59.6	.329	.37	3,550
December	71	35	49.6	.274	.32	3,050
January	48	25	36.7	.203	.23	2,260
February	128	38	66.4	.367	.38	3,690
March	288	74	118	.652	.75	7,260
April	1,130	175	463	2.56	2.86	27,600
May	1,530	563	974	5.38	6.20	59,900
June	2,950	1,130	2,050	11.3	12.61	122,000
July	1,330	224	666	3.68	4.24	41,000
August	377	70	154	.851	.98	9,470
September	72	27	51.0	.282	.31	3,030
The year	2,950	25	405	2.24	30.37	294,000

MERCED RIVER AT POHONO BRIDGE, NEAR YOSEMITE, CALIF.

LOCATION.—At Pohono Bridge, 5 miles below Yosemite, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 2, 1916, to September 30, 1917.

GAGE.—Friez water-stage recorder in concrete well on left bank about 150 feet above the bridge.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Control, boulders; permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.75 feet at 2 a. m. June 10 (discharge, 5,088 second-feet); minimum discharge about 40 second-feet; estimated by comparison with Merced River at Happy Isles.

ICE.—No ice forms at the station because of rapids.

DIVERSIONS.—None.

REGULATION.—Operation of the power plant at Happy Isles causes diurnal fluctuation.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 1,000 second-feet, well defined between 1,000 and 6,000 second-feet, and extended above. Daily discharge ascertained by use of a discharge integrator on the hydrograph. Records good November to March, excellent April to July, and roughly approximate August and September.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park.

Discharge measurements of Merced River at Pohono Bridge, near Yosemite, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	F. C. Ebert	1.04	105	June 8	Charles Leidl	7.52	4,560
Jan. 22	Charles Leidl	.86	94	9	do	8.44	5,530
Apr. 17	do	2.82	644	9	do	8.31	5,400
June 5	do	6.52	3,480	29	J. F. Kunesh	4.65	1,750
5	do	6.30	3,180	30	do	4.64	1,690
7	do	7.19	4,230	July 31	do	1.88	272

Daily discharge, in second-feet, of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	90	66	91	267	418	1,420	3,190	1,630	450
2	104	90	68	95	244	440	1,320	3,490	1,590	420
3	104	92	72	97	220	420	1,420	3,770	1,510	336
4	103	120	72	102	204	510	1,770	3,610	1,430	300
5	114	148	70	114	205	750	2,010	3,510	1,370	.....
6	131	128	68	122	214	860	2,270	3,730	1,370	.....
7	141	107	66	125	214	1,030	2,390	4,200	1,290	.....
8	141	112	65	133	217	1,210	1,960	4,730	1,200	.....
9	157	97	67	136	223	916	2,180	5,130	1,050	.....
10	164	104	70	134	185	760	2,130	4,980	884	.....
11	160	98	72	137	176	780	2,340	3,850	825	.....
12	120	100	72	132	172	875	2,200	3,620	846	.....
13	110	102	70	132	176	875	2,910	3,840	950	.....
14	108	94	85	128	173	866	3,240	4,210	840	.....
15	107	89	84	128	152	763	2,990	4,470	1,170	.....
16	105	85	81	132	158	720	2,590	4,490	1,540	.....
17	104	77	83	132	154	650	2,590	4,520	1,240	.....
18	103	80	83	133	168	630	2,130	4,400	985	.....
19	98	77	81	132	175	613	1,740	4,010	820	.....
20	90	76	85	128	193	655	1,500	3,750	751	.....
21	90	72	86	127	215	795	1,550	3,560	682	.....
22	90	71	84	147	183	990	1,660	3,220	580	.....
23	89	80	81	188	181	1,120	1,660	2,940	524	.....
24	85	81	85	266	194	1,630	1,550	2,760	475	.....
25	77	83	87	329	235	2,130	1,360	2,520	420	.....
26	83	95	94	282	272	2,320	1,290	2,450	421	.....
27	90	103	105	286	330	2,140	1,700	2,420	413	.....
28	91	94	102	292	480	1,850	1,980	2,380	394	.....
29	91	90	103	.....	662	1,370	1,930	2,150	362	.....
30	90	86	103	.....	650	1,330	2,600	1,740	323	.....
31	.....	75	88	.....	480	.....	2,870	.....	296	.....

NOTE.—Gage-height record incomplete Nov. 1, 12, 18, 21, 25, 27, Dec. 2, Jan. 22, Feb. 27, Mar. 4, 31, Apr. 2, 7, 9, 17, June 26–30, and July 21; discharge partly estimated. Discharge, Nov. 26, 29, 30, Dec. 1, and July 20, interpolated. Discharge, Apr. 14, obtained from staff-gage readings. Discharge for following periods estimated by comparison with records of flow of Merced River at Happy Isles Bridge: Nov. 13–17, 22–24, Dec. 26 to Jan. 21, Feb. 28 to Mar. 3, Apr. 3–6 and 10–13. No record Aug. 5 to Sept. 30; intake pipe clogged.

Monthly discharge of Merced River at Pohono Bridge, near Yosemite, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 2–31	164	77	108	6,210
December	148	71	93.4	5,740
January	105	65	80.6	4,960
February	329	91	156	8,660
March	662	152	251	15,400
April	2,320	418	1,010	60,100
May	3,240	1,290	2,040	125,000
June	5,130	1,740	3,590	214,000
July	1,630	296	909	55,900
August	.....	.....	a 209	12,900
September	.....	.....	a 83.7	4,980
The period	.....	.....	.....	514,000

a Estimated.

MERCED RIVER AT EXCHEQUER, CALIF.

LOCATION.—In the SW. ¼ NE. ¼ sec. 13, T. 4 S., R. 15 E., just above remains of an old dam at Exchequer, Mariposa County, just above mouth of Cotton Creek and about 8 miles upstream from Merced Falls.

DRAINAGE AREA.—1,020 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 28, 1915, to September 30, 1917.

GAGE.—Vertical staff in 4 sections bolted to solid rock ledge on right bank 250 feet above old dam. Gage read by Greene, Hannagan, Smallsbeck, and Trunnel.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders, gravel, and solid rock; control is an old concrete dam. Banks high, clean, and not likely to be overflowed. Point of zero flow, stage 4.4±0.1 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.9 feet at 4 p. m. February 21 (discharge, determined from extension of rating curve, about 21,700 second-feet); minimum stage recorded, 6.0 feet at 4 p. m. September 30 (discharge, 72 second-feet).

1915–1917: Maximum stage recorded, 20.0 feet at 4 p. m. January 17, 1916 (discharge, determined from extension of rating curve, about 22,000 second-feet); minimum stage recorded, 6.0 feet at 4 p. m. September 30, 1917 (discharge, 72 second-feet).

DIVERSIONS.—None.

REGULATION.—The several small power plants above have little or no storage. Effect of their operation is believed to be slight except during low stages.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 12,000 second-feet and extended for high water. Gage read twice daily to tenths. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for low water, when operation of power plants causes diurnal fluctuation.

Discharge measurements of Merced River at Exchequer, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 19	9.66	1,490	June 11	14.10	6,850
June 3	13.58	5,910	July 23	8.37	690
4	14.01	6,700			

Daily discharge, in second-feet, of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	110	254	220	404	374	1,460	1,200	3,070	5,090	2,320	404	160
2	1,080	242	266	468	374	1,320	1,140	2,740	5,930	2,130	468	160
3	922	231	436	1,860	346	1,200	1,140	2,740	6,670	1,950	502	160
4	736	242	574	972	346	1,080	1,200	3,190	6,480	1,860	468	142
5	612	404	612	780	374	1,020	1,320	3,670	6,290	1,780	404	142
6	538	404	538	612	374	972	1,950	4,340	6,110	1,780	374	160
7	538	332	468	538	374	972	2,320	4,930	7,240	1,780	346	160
8	502	346	404	468	404	972	2,740	3,670	8,040	1,690	346	151
9	468	332	360	404	404	1,080	3,190	3,880	8,450	1,460	318	160
10	538	332	346	374	436	1,080	2,130	3,670	8,870	1,200	318	142
11	538	360	318	374	436	1,020	1,780	4,480	6,290	1,080	292	134
12	538	360	318	374	404	1,020	1,950	3,670	5,580	1,080	292	126
13	538	332	318	374	404	972	1,950	5,750	6,110	972	292	126
14	574	305	292	404	404	972	2,040	5,750	6,290	1,140	292	126
15	538	266	266	404	404	922	1,780	6,110	7,240	1,380	292	126
16	538	231	266	374	404	922	1,610	4,780	7,240	1,690	279	126
17	612	209	254	318	404	874	1,460	4,780	7,240	2,220	292	126
18	694	209	242	292	436	874	1,320	4,060	7,240	1,380	292	126
19	612	231	242	292	502	874	1,320	3,430	6,480	1,080	279	113
20	538	209	242	292	5,410	874	1,260	3,070	6,110	922	266	99
21	266	209	242	292	17,400	874	1,460	2,850	5,410	874	266	96
22	468	188	242	292	18,500	874	1,950	2,960	4,780	780	254	96
23	502	188	538	292	6,480	874	2,520	3,070	4,480	694	242	110
24	404	209	1,260	292	7,640	874	2,960	2,960	3,800	612	242	110
25	332	209	922	292	8,660	874	3,430	2,740	3,430	538	220	110
26	318	198	612	292	3,930	874	4,060	2,320	3,190	538	209	96
27	305	254	404	292	2,520	1,080	4,200	2,630	2,960	538	198	96
28	292	266	404	292	1,860	1,380	3,670	3,670	2,850	468	188	96
29	279	242	404	292	.....	1,780	3,070	3,550	2,740	468	178	96
30	242	220	374	292	.....	1,780	2,740	4,480	2,520	468	178	78
31	242	.....	404	360	.....	1,460	.....	4,930	.....	436	160	.....

Monthly discharge of Merced River at Exchequer, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1,080	110	497	0.487	0.56	30,600
November	404	188	267	.262	.29	15,900
December	1,260	220	413	.405	.47	25,400
January	1,860	292	441	.432	.50	27,100
February	18,500	346	2,860	2.80	2.92	159,000
March	1,780	874	1,070	1.05	1.21	65,800
April	4,200	1,140	2,160	2.12	2.37	129,000
May	6,110	2,320	3,800	3.73	4.30	234,000
June	8,870	2,520	5,700	5.59	6.24	339,000
July	2,320	436	1,200	1.18	1.36	73,800
August	502	160	295	.289	.33	18,100
September	160	78	125	.123	.14	7,440
The year	18,500	78	1,550	1.52	20.69	1,130,000

TENAYA CREEK NEAR YOSEMITE, CALIF.

LOCATION.—At Tenaya Bridge, in Yosemite National Park, five-eighths mile below outlet of Mirror Lake, five-eighths mile above junction with Merced River, and 1⅞ miles east of Yosemite, Mariposa County.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—July, 1904, to June, 1909; January 5, 1912, to September 30, 1917 (incomplete).

GAGE.—Vertical staff fastened to left abutment near downstream end; read by an employee of Yosemite National Park. Original staff gage fastened to upstream side of bridge 9 feet from left abutment; datum unknown. About December 1, 1912, a new staff gage was installed at new datum on upstream side of bridge near right abutment. This gage was removed and the present gage installed February 4, 1913. Datum of present gage is 0.55 foot higher than that of gage previously used.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6 feet at 5.15 p. m. June 9 (discharge, 1,190 second-feet); minimum stage recorded, 1.2 feet, September 23–29 (discharge, 2.7 second-feet).

1904–1909, 1912–1917: Maximum stage recorded, 8.1 feet, June 16, 1906 (discharge, 1,280 second-feet); minimum stage recorded, 2.9 feet, September 12 and most of October, 1906 (discharge, 0.5 second-foot). Relation between datum of gage of that date and the present datum unknown.

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; not known to have been affected by ice during year. Rating curve well defined between 2 and 1,000 second-feet. Gage read to hundredths twice daily until November 18; then irregularly until August 5; then twice daily until September 1; not read September 2–22; then twice daily to half-tenths until September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Discharge for days of no record estimated by comparison with records for other stations in Yosemite National Park. Records good.

COOPERATION.—Gage-height record furnished by Yosemite National Park through W. B. Lewis, superintendent.

Discharge measurements of Tenaya Creek near Yosemite, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	F. C. Ebert	2.62	86	June 8	Charles Leidl	5.13	832
4	do	2.46	75	29	J. F. Kunesh	3.60	294
8	do	2.27	53	July 1	do	3.33	231
Jan. 21	Charles Leidl	1.74	16	31	H. D. McGlashan	1.80	21
Apr. 18	do	3.37	166	Aug. 2	do	1.83	24
June 6	do	4.80	705				

Daily discharge, in second-feet, of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	20	a21	a23	a25	a32	77	a300	555	229	a33	4.3
2	84	20	a22	a25	a26	a32	a77	a315	a610	.....	23.	.....
3	98	20	25	28	32	32	a77	330	660	.....	a18	.....
4	80	20	a30	a30	a32	a29	105	330	a642	.....	a13	.....
5	68	20	a37	a30	32	a27	a108	300	625	.....	8.5	.....
6	64	20	17	a31	a32	47	a111	300	695	.....	8.5	.....
7	62	22	a15	a32	a31	a53	113	420	a725	.....	8.5	.....
8	56	21	a17	32	a30	a56	147	a390	775	.....	7	.....
9	54	25	a16	a32	a30	a55	a162	360	1,190	.....	12	.....
10	54	24	a17	a32	a29	52	176	a360	935	.....	8.5	.....
11	56	24	17	a32	28	a52	a187	a360	625	.....	8.5	.....
12	60	25	a17	a31	a28	a52	198	360	420	.....	6.5	.....
13	62	21	a18	a30	a29	a52	a210	450	a430	.....	7.5	.....
14	66	24	a20	30	a29	a52	222	a405	a440	.....	8	.....
15	68	24	20	a24	a30	52	222	360	a445	.....	7	.....
16	66	22	a20	a18	a31	a52	a222	420	450	.....	7	.....
17	61	22	20	a18	32	a52	a222	a410	420	.....	6.5	.....
18	56	20	a25	a18	a33	52	222	a400	a395	.....	6.5	.....
19	49	a20	a24	a18	a35	52	a222	390	a370	.....	6.5	.....
20	39	a20	a21	a18	a31	47	a247	390	a345	.....	6.5	.....
21	32	20	a19	17	a28	47	272	a382	a320	.....	6.5	.....
22	25	a20	17	a18	25	52	272	375	a296	.....	6.5	.....
23	25	a20	a19	a18	a33	39	a277	a368	272	.....	6.5	2.7
24	24	a21	20	a19	a40	a40	a282	360	198	.....	8	2.7
25	25	22	a19	a20	a56	41	286	a380	a214	.....	6.5	2.7
26	25	a22	a18	22	a42	47	520	405	a230	.....	6.5	2.7
27	25	22	a18	a23	32	56	a386	390	246	.....	6.5	2.7
28	25	a22	a17	a24	a32	66	272	a405	a266	.....	5	2.7
29	20	a21	17	a24	.....	77	a279	420	286	.....	4.7	2.7
30	20	20	a17	a24	.....	72	286	a465	a260	.....	4.3	3.5
31	20	.....	a20	a25	.....	80	.....	a510	.....	22	4.3	.....

a Estimated by comparison with records for stations on Merced River and Yosemite Creek.

NOTE.—No gage-height record during July and first part of September or for days of estimated discharge.

Monthly discharge of Tenaya Creek near Yosemite, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	98	20	48.2	1.03	1.19	2,960
November	25	20	21.5	.457	.51	1,280
December	37	15	20.0	.426	.49	1,230
January	32	17	24.7	.526	.61	1,520
February	56	25	31.9	.679	.71	1,770
March	80	27	49.9	1.06	1.22	3,070
April	520	77	215	4.57	5.10	12,800
May	510	300	381	8.11	9.35	23,400
June	1,190	198	478	10.2	11.38	28,400
July	.....	.....	a85	1.81	2.09	5,230
August	33	4.3	8.90	.189	.22	547
September	.....	.....	a3.5	.074	.08	208
The year	1,190	.....	114	2.43	32.95	82,400

a Estimated.

YOSEMITE CREEK AT YOSEMITE, CALIF.

LOCATION.—At highway bridge in Yosemite National Park half a mile above junction with Merced River and one-fourth mile northwest of Yosemite, Mariposa County.

DRAINAGE AREA.—43.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—July, 1904, to June, 1909; January 4, 1912, to September 30, 1917 (incomplete).

GAGE.—Staff in two sections; upper, vertical, fastened to left abutment near downstream end; lower, inclined, fastened to boulder in front of upper section; read by an employee of Yosemite National Park. Original staff gage was on tree on right bank 50 feet above bridge. January 4, 1912, new staff gage was installed on tree on right bank 25 feet above bridge at approximately same datum. Present gage was installed February 5, 1913 at datum 3.04 feet higher.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Fine gravel and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet at 7.50 p. m. June 8 (discharge not determined because of backwater); minimum stage recorded, 2.6 feet August 30, 31, and September 18–29 (discharge, 0.5 second-foot).

1904–1909, 1912–1917: Maximum stage recorded June 8, 1917; channel dry September 9, 1915.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed June 8. Rating curves well defined between 6 and 300 second-feet; fairly well defined below, and indeterminate above owing to backwater. Gage read to hundredths twice daily October 1 to November 18 and August 19 to September 30, and occasionally the rest of the time. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair. Estimated discharge may be greatly in error.

COOPERATION.—Gage-height record furnished by Yosemite National Park through W. B. Lewis, superintendent.

Discharge measurements of Yosemite Creek at Yosemite, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	F. C. Ebert	3.28	42	June 9	Charles Leidl	6.80	645
4	do	3.13	30	30	J. F. Kunesh	4.29	182
8	do	3.01	20	July 1	do	4.10	145
Jan. 21	Charles Leidl	2.82	6.6	31	H. D. McGlashan	2.97	12
Apr. 18	do	3.61	82	Aug. 2	do	3.02	15
June 6	do	6.15	772				

Daily gage height, in feet, of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1	5.0	5.9	.....	4.1	.....	16	.....	5.95	.....	.....	.....
2	.....	5.0	7.3	.....	3.02	17	.....	.....	6.9	.....	.....
3	.....	5.7	7.5	.....	.....	18	3.61	5.2	.....	.....	.....
4	4.8	5.4	.....	.....	.....	19	4.2	6.0	.....	.....	.....
5	.....	6.0	.....	.....	.....	20	4.0	.....	6.0	.....	.....
6	.....	5.6	7.5	.....	.....	21	4.4	6.5	.....	.....	.....
7	4.7	5.8	.....	.....	.....	22	4.7	.....	.....	.....	.....
8	4.6	5.7	10.0	.....	.....	23	.....	6.1	.....	.....	.....
9	.....	.....	7.5	.....	.....	24	5.6	.....	.....	.....	.....
10	4.5	5.4	7.0	.....	.....	25	.....	.....	.....	.....	.....
11	.....	5.75	.....	.....	.....	26	5.51	6.4	.....	.....	.....
12	.....	6.2	.....	.....	.....	27	5.7	6.3	.....	.....	.....
13	.....	6.6	6.2	.....	.....	28	5.5	.....	5.4	.....	.....
14	4.5	6.05	.....	.....	.....	29	5.8	6.5	.....	.....	.....
15	4.5	6.2	.....	.....	.....	30	5.3	.....	4.29	.....	.....
						31	.....	7.2	.....	2.97	.....

NOTE.—Stage-discharge relation affected by backwater from ice and snow and from Merced River; discharge not determined.

Daily discharge, in second-feet, of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Aug.	Sept.
1	37	11	18	11	17	27	.....	0.5
2	48	11	18	11	17	22	.....	2.1
3	48	11	18	11	18	18	.....	2.1
4	35	11	14	11	18	21	.....	1.1
5	33	11	10	11	18	23	.....	.7
6	30	17	7	12	17	26	.....	.7
7	25	12	3.1	14	16	23	.....	2.1
8	20	14	6	13	15	21	.....	1.6
9	26	18	8	12	14	18	.....	1.6
10	24	14	13	12	14	18	.....	1.5
11	26	20	17	11	18	18	.....	1.4
12	28	18	22	11	22	21	.....	1.3
13	33	14	16	11	21	23	.....	1.3
14	32	17	11	14	19	26	.....	1.2
15	30	18	10	18	18	25	.....	1.1
16	26	11	8	16	19	23	.....	1.1
17	24	18	6	14	21	22	.....	1.1
18	22	18	5	12	22	22	.....	.7
19	18	18	6	10	22	18	5	.5
20	18	18	8	8	22	18	3.5	.5
21	14	18	10	6	22	22	2.1	.5
22	14	18	11	14	25	22	2.1	.5
23	14	16	8	17	27	26	2.1	.5
24	11	13	5	19	30	26	3.5	.5
25	11	11	8	22	35	37	2.1	.5
26	11	8	11	22	40	45	2.1	.5
27	11	5	14	22	36	52	1.3	.5
28	11	9	13	17	31	115	1.3	.5
29	11	14	12	17	.....	185	.7	.5
30	11	18	11	17	.....	150	.5	1.1
31	11	.....	11	17	.....	120	.5	.....

NOTE.—Gage read about once every third day from Nov. 19 to Mar. 16; discharge interpolated for days on which gage was not read, also Sept. 9–15 and 22. Discharge for April, May, and June not determined because of backwater from ice and snow and from Merced River. No record July 1 to Aug. 18.

Monthly discharge of Yosemite Creek at Yosemite, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 43.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	48	11	23.0	0.532	0.61	1,410
November	20	5	14.3	.331	.37	851
December	22	3.1	10.9	.254	.29	670
January	22	6	15.3	.354	.41	941
February	40	14	21.9	.507	.53	1,220
March	185	18	39.8	.921	1.06	2,450
August 19–31	5	.5	2.10	.049	.02	54.1
September	2.1	.5	.99	.023	.03	58.9

SOUTH FORK OF MERCED RIVER NEAR WAWONA, CALIF.

LOCATION.—In SE. ¼ sec. 33, T. 4 S., R. 21 E., opposite United States military camp in Sierra National Forest, and 1 mile below Wawona, Mariposa County. Big Creek enters half a mile above and Rush Creek three-fourths mile below station.

DRAINAGE AREA.—131 square miles (measured on topographic map).

RECORDS AVAILABLE.—December 15, 1910, to June 30, 1916; April 13, 1917, to September 30, 1917.

GAGE.—Vertical staff fastened to alder tree on left bank; installed August 22, 1911, 250 feet below site of original gage, which was vertical staff fastened to center pier of footbridge destroyed by high water January 30, 1911. Original datum has not been maintained. Gage read by J. C. Bruce.

DISCHARGE MEASUREMENTS.—Made from cable at gage, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.7 feet at 7.20 p. m., June 15 (discharge, 2,200 second-feet); minimum stage recorded, 2.07 feet, September 19–22, 27–30 (discharge, 13 second-feet).

1910–1917: Maximum stage recorded, 7.2 feet, January 26 and February 19 and 20, 1914 (discharge, 3,770 second-feet); minimum stage recorded, 1.4 feet, October 17 to November 8, 1915 (discharge, 0.2 second-foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—The ranch of the Wawona Co. is irrigated from a tributary above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 10 and 400 second-feet, fairly well defined between 400 and 2,000 second-feet, and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to discharge table. Records good for low and medium and fair for high stages.

The following discharge measurement was made by Charles Leidl:

April 12, 1917: Gage height, 3.58 feet; discharge, 450 second-feet.

Daily discharge, in second-feet, of South Fork of Merced River near Wawona, Calif., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	575	1,360	285	a 31	16	16	224	1,280	1,360	127	28	15
2	.....	605	1,540	a 285	25	16	17	224	1,360	a1,490	a 119	28	a 14
3	.....	575	1,280	285	31	a 16	18	204	a1,030	1,620	a 110	a 27	14
4	.....	735	a1,280	a 296	39	16	19	a 274	702	a1,530	a 101	26	13
5	.....	912	1,280	308	38	16	20	345	a 694	a1,450	92	24	13
6	.....	a 991	1,280	a 266	31	15	21	380	a 686	1,360	92	23	a 13
7	.....	1,070	a1,500	224	30	a 15	22	515	a 678	805	90	a 22	13
8	.....	840	1,720	a 211	a 31	15	23	a 642	670	770	a 85	a 22	14
9	.....	840	2,100	a 198	32	15	24	770	702	a 704	80	21	15
10	.....	805	1,720	185	31	15	25	1,030	545	638	66	21	14
11	.....	990	a1,720	166	30	15	26	1,110	515	a 592	a 62	20	a 14
12	.....	1,030	1,720	150	31	17	27	990	a 812	545	57	19	13
13	458	1,190	2,100	143	a 30	a 17	28	950	a1,110	a 462	57	a 18	13
14	405	1,440	2,100	136	28	a 16	29	638	a1,410	380	a 50	a 18	13
15	355	1,280	2,200	133	a 28	a 15	30	575	a1,700	244	a 44	17	13
							31	.....	2,000	.....	a 38	16	.....

a Interpolated.

Monthly discharge of South Fork of Merced River near Wawona, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 13–30	1,110	204	560	4.27	2.86	20,000
May	2,000	515	960	7.33	8.45	59,000
June	2,200	244	1,300	9.92	11.07	77,400
July	308	38	146	1.11	1.28	8,980
August	39	16	26.3	.201	.23	1,620
September	17	13	14.6	.111	.12	869
The period	.....	.....	.....	.....	.....	168,000

TUOLUMNE RIVER AND TRIBUTARIES.

TUOLUMNE RIVER BELOW HETCH HETCHY DAM SITE, NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ SE. ¼ sec. 17, T. 1 N., R. 20 E., in Yosemite National Park about three-fourths mile below Hetch Hetchy dam site and 11 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1914, to September 30, 1917. This station was established to take the place of the station at the dam site when it became necessary to discontinue that station on account of construction.

GAGE.—Gurley weight-driven printing water-stage recorder on left bank. Difference in elevation between the zero of this gage and that of gage at dam site, 53.15 feet.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage, or by wading.

CHANNEL AND CONTROL.—Boulders and solid rock; considered permanent. Bed at measuring section was smoothed off by removing some boulders. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 13.8 feet at 4 a. m. June 10 (discharge, 10,000 second-feet); minimum stage, from water-stage recorder, 1.56 feet, September 30 (discharge, 34 second-feet). See foot-note to daily-discharge table.

1915–1917: Maximum stage, recorded June 10, 1917; minimum stage, from water-stage recorder, 1.16 feet November 4 to 7 [illegible] harge, 14 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 4 and June 9 by débris lodging upon control. Rating curves well defined. Daily discharge ascertained by applying to rating table mean daily gage height determined by averaging gage-height record or, for days of considerable fluctuation, by averaging mean hourly discharge (see footnote to daily-discharge table). Records excellent.

Discharge measurements of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 21	C. J. Emerson	3.14	181	13	H. M. Stafford	11.27	5,040
Feb. 6	do	3.78	244	15	do	12.01	6,360
10	do	3.75	244	16	do	13.07	8,420
28	do	4.98	458	July 1	do	9.80	3,150
Mar. 24	do	4.48	360	16	do	8.99	2,320
30	do	6.46	852	25	do	6.31	786
Apr. 6	do	7.05	1,120	Aug. 9	do	3.85	264
24	do	8.07	1,660	21	do	3.13	166
May 17	H. M. Stafford	9.65	3,160	Sept. 3	C. J. Emerson	2.48	107
30	do	9.44	2,800	21	do	1.89	53
June 5	do	10.85	4,810				

Daily discharge, in second-feet, of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	395	233	170	198	175	449	595	1,780	4,530	3,710	570	110
2	970	233	191	198	180	422	570	1,510	5,490	3,710	522	105
3	730	240	247	217	180	404	534	1,510	6,130	3,590	478	99
4	715	247	500	217	198	413	700	2,010	5,910	3,350	458	93
5	615	270	495	224	231	440	1,030	2,350	5,910	3,240	422	94
6	602	278	489	202	245	522	1,280	2,630	6,590	3,350	377	117
7	565	334	341	198	245	478	1,570	2,930	7,830	3,130	332	146
8	520	334	308	198	245	489	1,780	2,630	9,170	3,020	284	123
9	520	377	268	198	252	468	1,280	2,930	8,710	2,610	260	101
10	540	413	238	198	245	440	1,000	2,630	8,290	2,160	252	88
11	590	413	224	210	245	386	1,060	3,050	5,940	2,080	238	78
12	628	342	224	210	238	359	1,280	2,730	5,260	2,080	252	72
13	640	278	231	198	231	341	1,180	3,870	5,940	2,000	252	66
14	640	247	224	217	224	332	1,030	4,710	6,870	2,080	238	66
15	670	233	210	154	210	308	900	4,530	7,670	2,340	224	62
16	745	220	204	142	210	316	775	3,290	7,670	2,520	231	58
17	860	211	198	146	238	316	700	3,290	8,080	2,080	210	56
18	775	206	192	164	224	341	658	2,830	7,870	1,920	192	55
19	685	194	192	175	224	350	658	2,260	7,270	1,570	180	56
20	640	161	192	164	316	368	745	1,780	7,070	1,390	175	56
21	615	170	186	158	377	413	880	1,780	6,680	1,230	164	54
22	602	161	170	152	558	368	1,230	1,850	6,300	1,040	158	52
23	500	155	164	150	511	332	1,390	1,930	5,760	920	153	50
24	431	149	186	152	730	377	2,090	2,010	5,260	805	152	49
25	377	136	186	158	1,130	449	2,730	1,710	4,950	775	158	47
26	350	172	210	180	632	500	2,930	1,510	4,650	730	158	44
27	350	212	238	186	511	582	2,730	2,170	4,510	730	151	41
28	334	205	238	175	468	900	2,530	2,730	4,800	670	135	38
29	286	172	217	175	.....	1,180	1,930	2,530	4,370	595	125	35
30	262	166	204	186	.....	920	1,710	3,290	3,710	522	119	34
31	247	.....	210	180	.....	685	.....	3,870	.....	489	115	.....

NOTE.—Recorder not running Dec. 5; discharge estimated. Jan. 6, there was an ice jam or snowslide somewhere upstream; stage fell to 1.83 feet (discharge, 50 second-feet) at 7 a. m. and rose to 4.55 feet (discharge, 377 second-feet) at 11 a. m. Jan. 15 this happened again; stage dropped to 1.45 feet (discharge, 28 second-feet) at 7 a. m. and rose to 4.42 feet (discharge, 354 second-feet) at 12.30 p. m. Daily discharge for those days computed from mean hourly discharge.

Monthly discharge of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	970	247	561	34,500
November	413	136	239	14,200
December	500	164	243	14,900
January	224	142	183	11,300
February	1,130	175	338	18,800
March	1,180	308	473	29,100
April	2,930	534	1,320	78,500
May	4,710	1,510	2,600	160,000
June	9,170	3,710	6,310	375,000
July	3,710	489	1,950	120,000
August	570	115	250	15,400
September	146	34	71.5	4,250
The year	9,170	34	1,210	876,000

TUOLUMNE RIVER NEAR BUCK MEADOWS,[1] CALIF.

LOCATION.—In SW. ¼ sec. 24, T. 1 S., R. 17 E., 1 mile below junction with South Fork of Tuolumne River and 2 miles north of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 2, 1907, to September 30, 1917 (not complete).

GAGE.—Gurley electric printing water-stage recorder on left bank, put in operation January 2, 1913. Previously, station was maintained by the Yosemite Power Co. in the pool above. Gage consisted of a vertical staff on left bank at site of United States Geological Survey's present cable. The Survey began reading the gage November 17, 1913, and developed a curve of relation.

DISCHARGE MEASUREMENTS.—Made from cable one-third mile above gage.

CHANNEL AND CONTROL.—Boulders and solid rock; probably permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 11.3 feet at 2 a. m. June 9 (discharge, 17,700 second-feet); minimum stage from water-stage recorder, 0.76 foot at 11 p. m. September 30 (discharge, 50 second-feet).

1907–1917: Maximum stage recorded, 14.00 feet January 14, 1909 (discharge, 27,200 second-feet); minimum stage recorded, 0.70 foot October 3, 1912 (discharge, 32 second-feet).

DIVERSIONS.—A small amount of water is diverted from South Fork of Tuolumne River, at Harden ranch, 7 miles above its mouth for irrigation in the vicinity of Groveland.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Much trouble with water-stage recorder caused breaks in record (see footnote to daily-discharge table). Mean daily gage height determined by averaging gage heights recorded every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of missing record, for which it was estimated. Records excellent when recorder is running; estimates considered fair.

[1] Formerly published as "near Groveland."

Discharge measurements of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	C. J. Emerson	4.31	1,250	June 11	C. J. Emerson	9.23	9,270
23	do	2.28	291	15	do	9.76	10,800
Dec. 11	do	3.27	614	16	do	10.42	13,300
Mar. 3	H. M. Stafford	4.47	1,330	25	do	8.94	8,120
May 10	C. J. Emerson	7.87	5,690	28	do	8.32	6,790
14	do	8.93	8,120	July 18	do	6.07	2,920
26	do	6.31	3,230	28	do	3.84	962
June 4	do	9.21	9,260	Aug. 4	do	3.23	632
9	do	11.08	17,000				

Daily discharge, in second-feet, of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	750	382	390	520	488	1,710	1,900	4,100	7,990	5,550	690	149
2	2,000	368	550	540	496	1,500	1,760	3,600	9,110	5,750	735	142
3	1,710	359	850	690	496	1,380	1,710	3,690	10,400	5,550	668	135
4	1,580	368	1,550	622	540	1,380	2,040	4,650	10,000	5,190	622	129
5	1,340	474	1,600	600	600	1,380	2,690	5,550	9,710	5,010	580	123
6	1,230	516	1,450	550	668	1,580	3,410	5,950	10,700	5,010	520	124
7	1,230	560	1,030	530	668	1,500	.....	6,790	11,900	4,830	474	160
8	1,080	600	950	520	668	1,500	.....	5,950	13,100	4,650	426	169
9	1,020	668	780	510	690	1,460	.....	6,570	14,300	4,250	387	145
10	1,020	735	645	513	690	1,400	.....	6,150	15,200	3,480	362	126
11	1,160	735	622	520	690	1,300	.....	6,790	11,000	3,200	345	114
12	1,190	690	600	520	668	1,200	.....	5,950	9,410	3,200	331	104
13	1,190	560	600	520	645	1,100	.....	7,730	10,000	2,990	354	96
14	1,160	492	580	510	622	1,030	.....	9,410	11,800	2,930	334	92
15	1,160	460	560	468	600	1,000	.....	9,410	13,000	3,270	324	90
16	1,190	435	520	411	600	1,020	.....	7,010	13,000	3,480	313	85
17	1,340	414	506	414	690	1,030	.....	6,790	13,400	3,130	308	80
18	1,300	405	499	429	668	1,040	.....	5,950	13,000	2,750	286	75
19	1,160	380	496	450	645	1,050	.....	5,010	11,800	2,360	262	74
20	1,050	340	502	441	1,340	1,120	.....	3,930	11,800	2,090	249	73
21	982	340	485	432	3,620	1,270	.....	3,850	10,600	1,840	234	72
22	920	320	457	408	4,330	1,160	.....	3,930	10,100	1,580	220	71
23	835	296	450	399	2,750	1,050	.....	4,330	9,000	1,380	212	71
24	712	298	560	402	4,330	1,120	.....	4,490	8,100	1,190	204	70
25	622	284	506	414	5,190	1,340	.....	4,010	7,490	1,120	206	68
26	560	400	540	457	3,130	1,540	.....	3,340	7,250	1,020	208	66
27	540	440	580	485	2,240	1,710	.....	4,170	7,010	982	202	62
28	516	430	600	478	1,890	2,410	.....	5,370	7,250	920	192	58
29	482	370	580	474	.....	3,000	.....	5,370	6,790	835	174	53
30	426	370	540	520	.....	2,600	.....	6,350	5,750	760	163	51
31	402	.....	540	510	.....	2,100	.....	7,250	.....	690	156	.....

NOTE.—No record Oct. 1–2, Nov. 19–22, Nov. 26 to Dec. 9, Jan. 5–7, 12, Mar. 10–18, Mar. 29 to Apr. 1, Apr. 7 to May 2, June 7–8, 21–24, discharge estimated by comparison with the combined discharge of Cherry Creek, Eleanor Creek, Tuolumne River below Hetch Hetchy dam site and South Fork of Tuolumne River near Buck Meadows, and by comparison with Tuolumne River above La Grange dam near La Grange.

Monthly discharge of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,000	402	1,030	63,300
November	735	284	450	26,800
December	1,600	390	681	41,900
January	690	399	492	30,300
February	5,190	488	1,450	80,500
March	3,000	1,000	1,450	89,200
April			[a] 3,320	198,000
May	9,410	3,340	5,590	344,000
June	15,200	5,750	10,300	613,000
July	5,750	690	2,940	181,000
August	735	156	346	21,300
September	169	51	97.6	5,810
The year			2,340	1,700,000

[a] Estimated.

TUOLUMNE RIVER ABOVE LA GRANGE DAM, NEAR LA GRANGE, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 3 S., R. 14 E., 3½ miles above La Grange dam and 5 miles above La Grange, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 19, 1915, to September 30, 1917.

GAGE.—Gurley weight-driven printing water-stage recorder in reinforced-concrete gage house and well on left bank.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet below the gage or by wading.

CHANNEL AND CONTROL.—Bed is solid rock and boulders. Banks are high; one channel at all stages. Control is solid rock dyke extending entirely across the stream and at low water there is a drop of about 5 feet over it. Point of zero flow is at stage 0.06 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 27.58 feet at 5.15 p. m. February 21 (discharge determined from extension of rating curve, 36,500 second-feet); minimum stage recorded, 1.72 feet from 8 to 12 p. m. September 30 (discharge, 26 second-feet).

1916–17: Maximum stage recorded, 27.58 feet at 5.15 p. m. February 21, 1917 (discharge, 36,500 second-feet); minimum stage recorded, 1.72 feet from 8 to 12 p. m. September 30, 1917 (discharge, 26 second-feet).

DIVERSIONS.—Yosemite Power Co.'s canal heads 9½ miles above and returns its water about half a mile above the bridge at La Grange. There is also a diversion from South Fork of Tuolumne River at Harden ranch for use in vicinity of Groveland.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Mean daily gage height determined by averaging gage heights printed every 15 minutes by the water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Tuolumne River above La Grange dam, near La Grange, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 18	4.69	507
Mar. 25	7.73	1,840
July 24	6.59	1,260

Daily discharge, in second-feet, of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	173	440	476	921	758	2,970	2,790	5,840	9,360	6,260	692	160
2	2,200	417	741	883	708	2,520	2,610	5,430	10,400	6,260	792	154
3	2,130	406	1,130	2,970	692	2,200	2,440	5,040	11,500	6,260	724	145
4	1,660	417	1,980	1,430	708	2,130	2,610	5,840	11,500	5,840	660	138
5	1,540	583	2,520	1,080	775	2,060	3,420	6,960	11,000	5,430	628	130
6	1,280	660	2,360	1,000	864	2,280	4,440	7,560	11,300	5,430	583	121
7	1,430	724	1,540	864	921	2,200	5,170	8,610	13,200	5,300	514	123
8	1,240	724	1,190	810	902	2,200	6,400	8,010	13,800	5,040	464	162
9	1,100	724	1,040	846	902	2,360	5,430	8,310	16,000	4,670	428	170
10	1,100	792	902	741	902	2,440	4,330	8,160	17,000	3,900	395	146
11	1,190	846	810	724	883	2,060	3,800	8,460	12,700	3,420	373	127
12	1,240	846	758	775	883	1,850	4,910	7,560	10,700	3,330	352	113
13	1,240	708	758	758	864	1,850	5,040	8,610	10,600	3,240	352	102
14	1,240	613	741	741	864	2,130	4,440	10,700	12,000	3,150	362	89
15	1,190	554	708	724	828	1,780	3,900	11,300	13,300	3,330	342	82
16	1,240	527	660	644	810	1,660	3,510	9,060	13,200	3,600	331	76
17	1,280	501	628	554	960	1,600	3,060	8,610	14,100	3,420	321	67
18	1,380	476	613	554	980	1,660	2,790	7,710	14,100	2,970	311	59
19	1,240	464	613	613	980	1,660	2,610	6,680	12,600	2,520	292	60
20	1,100	440	613	598	7,870	1,720	2,700	5,300	12,600	2,200	269	49
21	1,040	406	613	583	22,900	1,850	3,060	4,910	11,500	1,920	257	52
22	1,000	395	598	568	18,500	1,780	3,900	4,910	11,200	1,660	242	46
23	960	373	810	554	8,160	1,660	4,550	5,300	10,100	1,430	230	48
24	828	362	2,280	540	11,800	1,660	5,980	5,560	9,360	1,280	223	50
25	724	352	1,240	540	11,000	1,780	7,860	5,300	8,760	1,150	215	82
26	644	362	846	568	6,680	2,130	9,060	4,440	8,310	1,100	217	52
27	598	476	828	644	4,440	2,280	8,760	4,790	7,710	1,020	217	47
28	568	540	960	660	3,510	3,060	8,160	6,400	8,160	1,000	210	42
29	554	501	980	660	.....	4,000	6,540	6,820	7,860	921	205	35
30	514	440	846	741	.....	4,220	5,560	7,710	6,820	828	180	28
31	464	.....	828	864	.....	3,420	.....	8,610	.....	758	170	.....

Monthly discharge of Tuolumne River above La Grange dam, near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,200	173	1,100	67,600
November	846	352	536	31,900
December	2,520	476	1,020	62,700
January	2,970	540	811	49,900
February	22,900	692	3,970	220,000
March	4,220	1,600	2,230	137,000
April	9,060	2,440	4,660	277,000
May	11,300	4,440	7,050	433,000
June	17,000	6,820	11,400	678,000
July	6,260	758	3,180	196,000
August	792	170	373	22,900
September	160	28	91.8	5,460
The year	22,900	28	3,010	2,180,000

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Combined daily discharge, in second-feet, of Tuolumne River above La Grange dam and Yosemite Power Co.'s canal, near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	241	508	544	983	826	3,030	2,850	5,900	9,420	6,320	754	219
2	2,270	485	809	948	776	2,580	2,670	5,490	10,500	6,320	854	213
3	2,190	474	1,180	3,030	760	2,260	2,500	5,100	11,600	6,320	786	204
4	1,730	485	2,050	1,490	776	2,190	2,670	5,900	11,600	5,900	722	197
5	1,600	651	2,590	1,140	843	2,120	3,480	7,020	11,100	5,490	690	189
6	1,350	728	2,420	1,060	932	2,340	4,500	7,620	11,400	5,490	645	180
7	1,500	792	1,610	929	989	2,260	5,230	8,670	13,300	5,360	573	182
8	1,310	792	1,260	872	970	2,260	6,460	8,070	13,900	5,100	523	221
9	1,170	792	1,110	911	970	2,420	5,490	8,370	16,100	4,730	490	229
10	1,170	860	970	806	970	2,500	4,390	8,220	17,100	3,960	454	205
11	1,260	914	878	789	951	2,120	3,860	8,520	12,800	3,480	432	186
12	1,300	914	823	840	951	1,910	4,970	7,620	10,800	3,390	411	172
13	1,300	776	826	826	932	1,910	5,100	8,670	10,700	3,300	411	161
14	1,310	681	809	809	932	2,190	4,500	10,800	12,100	3,210	421	148
15	1,260	622	776	792	896	1,780	3,960	11,400	13,400	3,390	401	141
16	1,310	595	728	712	878	1,720	3,570	9,120	13,300	3,660	390	135
17	1,350	569	696	622	1,030	1,660	3,120	8,670	14,200	3,480	380	126
18	1,380	544	681	622	1,050	1,720	2,850	7,770	14,200	3,030	370	118
19	1,310	532	681	681	1,040	1,720	2,670	6,740	12,700	2,580	351	119
20	1,170	508	681	666	7,940	1,780	2,760	5,360	12,700	2,260	328	108
21	1,110	474	681	651	23,000	1,910	3,120	4,970	11,600	1,980	316	111
22	1,060	463	666	636	18,500	1,840	3,960	4,970	11,300	1,720	301	105
23	1,020	441	872	622	8,200	1,720	4,610	5,360	10,200	1,490	289	107
24	893	430	2,330	608	11,800	1,720	6,040	5,620	9,420	1,340	282	109
25	792	420	1,290	608	11,100	1,840	7,920	5,360	8,820	1,210	274	110
26	712	430	908	636	6,740	2,190	9,120	4,500	8,370	1,160	276	111
27	666	544	893	712	4,440	2,340	8,820	4,850	7,770	1,080	276	106
28	636	608	1,020	728	3,570	3,120	8,220	6,460	8,230	1,060	269	101
29	622	569	1,040	728	.....	4,000	6,600	6,880	7,920	983	264	94
30	582	508	908	809	.....	4,280	5,620	7,770	6,880	890	239	87
31	532	.....	893	932	.....	3,480	.....	8,670	.....	820	229	.....

NOTE.—See p. 160 for table of daily discharge of Yosemite Power Co.'s canal.

Monthly discharge of Tuolumne River above La Grange dam and Yosemite Power Co.'s canal, near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,270	241	1,160	71,300
November	914	420	604	35,900
December	2,590	544	1,080	66,400
January	3,030	608	877	53,900
February	23,000	760	4,030	224,000
March	4,280	1,660	2,290	141,000
April	9,120	2,500	4,720	281,000
May	11,400	4,500	7,110	437,000
June	17,100	6,880	11,400	678,000
July	6,320	820	3,240	199,000
August	854	229	432	26,600
September	229	87	150	8,930
The year	23,000	87	3,080	2,220,000

TUOLUMNE RIVER NEAR LA GRANGE, CALIF.

LOCATION.—In NE. ¼ SE. ¼ sec. 17, T. 3 S., R. 14 E., at La Grange dam, 1¼ miles northeast of La Grange, Stanislaus County.

DRAINAGE AREA.—1,500 square miles.

RECORDS AVAILABLE.—August 30, 1895, to September 30, 1917.

GAGE.—Painted on rock ledge on right bank 80 feet above dam; read by F. A. Townsend. Zero of gage is at average elevation of crest of dam. Until March 31, 1908, the station was located at the wagon bridge at La Grange.

DISCHARGE.—Computed by means of weir formula from gage heights showing depth of water on crest of curved masonry diversion dam. Coefficient was determined from current-meter measurements made at highway bridge at La Grange; corrected to give discharge at dam. To obtain the total flow of Tuolumne River above La Grange dam, it is necessary to combine the flow over the dam with the discharge of Modesto, Turlock, and Yosemite Power Co.'s canals.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Dam is a permanent control.

EXTREMES OF DISCHARGE.—Maximum stage during year, 6.5 feet June 9 (discharge, 15,000 second-feet); minimum stage, no flow over dam (see footnote to daily-discharge table).

1907–1917: Maximum stage recorded, 16.45 feet, on the morning of January 31, 1911; crest of flood from high-water mark on gage (discharge, 60,300 second-feet); minimum stage, no flow over dam for long periods every year.

DIVERSIONS.—Modesto and Turlock canals divert at dam. Yosemite Power Co.'s canal heads 13 miles above the dam and returns its water below the dam, about half a mile above the bridge at La Grange. There is also a diversion from South Fork of Tuolumne River at Harden ranch for use in vicinity of Groveland.

REGULATION.—At low water the small amount of storage behind La Grange dam affects the flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good. The flow over the dam is at times affected by seepage through dam and by the water discharged through the ports and sand gates in the dam.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Tuolumne River near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	0	320	476	838	95	2,370	972	4,240	7,240	3,160
2	2,370	320	648	710	81	1,920	673	3,800	8,360	3,370
3	2,280	274	1,180	3,160	165	1,420	476	3,370	9,510	3,160
4	1,660	320	2,000	1,260	165	1,660	589	4,240	9,220	2,750
5	1,580	476	2,460	905	71	1,740	1,340	4,700	9,220	2,560
6	1,180	648	2,370	878	29	1,920	2,180	5,180	9,220	2,370
7	1,740	530	1,580	772	0	1,830	2,950	5,920	11,700	2,180
8	1,340	589	972	747	0	1,660	4,240	5,180	12,300	2,000
9	1,040	589	838	772	0	1,500	2,950	5,670	14,000	1,830
10	1,040	710	710	710	0	1,340	1,920	5,180	14,000	1,180
11	1,340	747	648	648	0	905	1,500	5,920	11,100	710
12	1,260	799	648	673	0	747	2,370	4,940	8,360	747
13	1,180	624	589	648	0	589	2,560	6,180	8,080	554
14	1,110	554	589	710	0	905	2,000	8,360	10,100	421
15	1,040	443	624	589	0	772	1,500	8,930	11,400	554
16	1,180	370	554	589	0	772	905	6,180	11,400	1,110
17	1,340	370	530	530	0	530	554	5,670	12,000	772
18	1,340	401	589	530	0	421	229	4,700	12,000	370
19	1,180	370	554	589	0	274	149	3,800	10,100	55
20	1,110	340	443	554	3,370	229	160	2,370	10,100	.....
21	1,040	302	443	443	16,800	340	443	2,460	9,220	.....
22	905	320	443	554	16,800	370	1,180	2,180	8,930	.....
23	905	302	673	508	7,240	189	1,920	2,460	7,520	.....
24	799	302	2,560	530	10,400	135	3,370	2,750	6,700	.....
25	624	229	1,110	530	10,400	320	5,180	2,560	6,180	.....
26	624	229	747	589	5,920	624	6,440	1,830	5,420	.....
27	421	320	710	648	3,800	710	6,180	2,180	4,940	.....
28	508	421	838	421	3,370	1,340	5,670	3,800	5,420	.....
29	476	443	972	213	.....	2,370	4,470	4,470	5,420	.....
30	476	401	772	149	.....	2,560	3,800	5,420	4,020	.....
31	370	.....	747	274	.....	1,660	.....	6,180	.....	.....

NOTE.—Observer reported as follows: Oct. 1 to Feb. 1, one port open; Feb. 2–8 ports closed; Feb. 7, water dripping over dam; Feb. 8–19, no water over dam; Fed. 25 to Mar. 18, ports closed; Mar. 19–21, one port open; Mar. 25 to June 30, one port open; Apr. 20, no water over dam in morning; July 19, water dripping over dam; July 20 to Sept. 30, no water over dam.

Monthly discharge of Tuolumne River near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,370	0	1,080	66,400
November	799	229	435	25,900
December	2,560	443	936	57,600
January	3,160	149	699	43,000
February	16,800	0	2,810	156,000
March	2,560	135	1,100	67,600
April	6,440	149	2,300	137,000
May	8,930	1,830	4,540	279,000
June	14,000	4,020	9,070	540,000
July	3,370	0	963	59,200
August	0	0	0	0
September	0	0	0	0
The year	16,800	0	1,980	1,430,000

FALLS CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In NE. ¼ sec. 3, T. 1 N., R. 20 E., in Yosemite National Park, 300 feet above branch to Tueeulala Falls, one-fourth mile above Wapama Falls, and 13 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 22, 1915, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder in reinforced concrete house on masonry well on right bank.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed of broken boulders; rough; channel straight above and below station. Control is ledge of rock 75 feet below gage. Banks not subject to overflow. Point of zero flow at stage 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.6 feet at 8 a. m., June 10 (discharge, 1,200 second-feet); minimum stage from water-stage recorder, 1.01 feet at 11 p. m., September 30 (discharge, 1.7 second-feet).

1916–17: Maximum stage June 10, 1917; minimum stage from water-stage recorder, 0.98 foot November 22, 1915 (discharge, 1.5 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 10 second-feet, and fairly well defined below. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent except those for extremely low water which are good.

Discharge measurements of Falls Creek near Sequoia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	H. M. Stafford	2.72	128	June 1	H. M. Stafford	4.28	583
25	do	2.24	53	14	do	5.12	986
31	do	2.00	27	19	do	5.16	1,010
Nov. 16	do	2.05	35	19	do	5.14	974
24	do	1.90	22	29	do	4.57	716
Dec. 22	do	2.02	32	July 25	do	2.48	75
Apr. 10	C. J. Emerson	2.96	176	Aug. 11	do	1.83	20
21	H. M. Stafford	3.06	200	Sept. 19	C. J. Emerson	1.16	3.1

Daily discharge, in second-feet, of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	103	27	29	40	37	61	97	303	644	512	50	6.8
2	252	26	35	44	34	64	95	261	745	549	52	6.3
3	190	27	63	42	35	64	97	264	810	530	47	5.7
4	155	29	183	41	40	63	140	330	766	491	43	5.2
5	131	40	164	42	45	78	183	384	766	463	39	5.1
6	129	51	108	41	48	86	213	423	788	463	35	5.6
7	114	62	72	39	47	76	266	477	900	446	29	6.6
8	100	64	61	37	47	64	269	484	948	443	25	6.8
9	99	74	51	35	48	59	203	512	1,050	413	22	6.3
10	108	80	48	35	47	54	185	467	1,070	333	21	5.6
11	119	82	40	36	46	57	219	487	832	306	19	4.7
12	121	66	41	35	42	55	238	463	724	318	18	4.2
13	125	50	44	35	40	44	188	587	766	294	19	3.8
14	127	41	41	34	36	45	162	745	900	275	18	3.5
15	138	36	38	37	35	54	134	745	972	309	18	3.3
16	155	34	35	42	36	51	114	549	972	272	22	3.2
17	180	32	35	38	39	49	99	477	996	252	22	3.1
18	164	32	35	34	41	50	90	429	996	216	18	2.9
19	136	30	35	29	47	52	95	318	924	193	16	2.7
20	119	25	35	28	49	56	112	236	924	171	15	2.6
21	112	25	33	23	58	57	153	216	900	146	13	2.4
22	106	24	31	27	56	51	200	227	877	115	13	2.4
23	88	23	41	22	56	50	269	275	810	99	12	2.7
24	66	22	55	26	66	57	359	309	745	88	13	2.7
25	52	21	80	30	93	72	416	258	704	83	13	2.6
26	45	42	140	35	67	80	426	208	684	77	12	2.4
27	43	45	144	35	59	106	460	303	644	76	12	2.2
28	42	40	102	32	66	148	512	420	684	68	11	2.1
29	36	32	68	31	.....	155	343	404	664	58	9.2	1.9
30	31	28	55	33	.....	117	321	484	549	51	8.5	1.8
31	29	.....	45	37	.....	97	.....	568	.....	46	7.9	.....

NOTE.—Water-stage recorder not working properly Oct. 1 and 2; discharge estimated by comparison with that of Tuolumne River below Hetch Hetchy dam site near Sequoia.

Monthly discharge of Falls Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	252	29	110	6,760
November	82	21	40.3	2,400
December	183	29	64.1	3,940
January	44	22	34.7	2,130
February	93	34	48.0	2,700
March	155	44	70.1	4,310
April	512	90	222	13,200
May	745	208	407	25,000
June	1,070	549	825	49,100
July	549	46	263	16,200
August	52	7.8	21.7	1,330
September	6.8	1.8	3.91	233
The year	1,070	1.8	176	127,000

CHERRY CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 28, T. 2 N., R. 19 E., in Stanislaus National Forest, at abandoned sawmill camp 3 miles by trail from Lake Eleanor and about 13 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—114 square miles [1] (above dam site in sec. 5, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1917.

GAGE.—Gurley printing water-stage recorder on right bank 800 feet above site of old suspension bridge. Original gage was a Lietz graph water-stage recorder at the bridge. It was moved upstream to present site (new datum) October 22, 1913, and replaced by the present gage (same datum) November 30, 1914.

DISCHARGE MEASUREMENTS.—Made from cable 800 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed is fine gravel and sand, which shifts slightly, but control is a solid-rock dike except at right bank, where it is gravel and small boulders. Zero flow is at gage height 0.4 foot. Channel is straight above and curved to right below. Left bank is high; right bank fairly high and probably not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.1 feet at 10 p. m. June 9 (discharge, determined from extension of rating curve, 3,800 second-feet); minimum stage from water-stage recorder, 0.81 foot, September 30 (discharge, 1.0 second-foot).

1910–1917: Maximum mean daily discharge, 7,000 second-feet January 30, 1911 (maximum stage unknown); channel dry September 6–12, 1910.

ICE.—Stream freezes over at gage but not at control. No ice effect on stage-discharge relation has been detected.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for high water changed sometime before high water by two fallen trees in the stream below control. Rating curve well defined between 10 and 3,000 second-feet. Operation of water-stage recorder satisfactory throughout the year except those periods stated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by averaging the readings for the day. Records excellent, except those for extreme low water, which are considered good.

Discharge measurements of Cherry Creek near Sequoia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	H. M. Stafford	2.64	235	May 12	H. M. Stafford	4.59	981
20	do	2.50	192	16	do	4.8	1,120
30	do	1.92	62	29	do	4.48	949
Nov. 20	do	1.70	39	June 4	do	6.48	2,040
27	do	2.02	87	15	do	6.47	2,010
28	do	2.10	100	18	do	6.87	2,230
29	do	1.90	65	18	do	6.67	2,070
Dec. 9	do	2.34	144	30	do	4.57	1,020
16	do	2.14	98	July 26	do	2.27	129
Jan. 15	do	2.09	93	Aug. 18	do	1.51	24
27	do	2.12	90	Sept. 15	C. J. Emerson	1.00	2.6
Feb. 26	do	2.67	245	17	do	.95	2.0
Apr. 13	do	3.32	482	27	do	.84	1.2
24	do	4.14	801				

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24 1912.

Daily discharge, in second-feet, of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	250	54	65	102	84	176	272	800	1,780	1,070	85	9.1
2	610	50	89	104	87	161	268	712	1,950	1,070	84	8.2
3	459	47	252	110	96	167	282	778	2,010	1,070	77	7.4
4	402	49	592	114	119	191	421	1,020	1,950	1,000	71	6.6
5	295	122	482	110	142	216	572	1,160	1,890	935	65	5.9
6	319	179	275	102	150	223	652	1,300	2,070	935	60	5.3
7	302	170	188	100	142	200	800	1,330	2,310	890	54	5.3
8	245	170	161	92	142	194	800	1,260	2,640	868	48	4.7
9	248	200	144	94	144	197	592	1,400	2,920	800	42	4.2
10	275	200	129	100	139	204	508	1,260	2,570	652	38	3.9
11	302	179	124	108	136	167	548	1,280	1,950	612	34	3.7
12	295	124	134	96	114	144	632	1,070	1,720	612	32	3.7
13	282	96	142	89	110	134	528	1,460	1,950	592	32	3.7
14	252	84	129	89	102	124	451	1,660	2,310	536	32	3.5
15	252	78	119	82	102	114	376	1,380	2,440	592	30	3.3
16	268	71	110	75	114	117	319	1,230	2,440	528	28	2.9
17	289	69	108	73	122	131	282	1,200	2,500	482	27	2.6
18	261	68	112	73	106	147	258	980	2,250	406	26	2.4
19	223	59	119	74	98	150	282	734	2,190	351	24	2.3
20	194	47	117	77	82	170	358	612	2,190	302	24	2.2
21	170	54	100	71	64	185	493	692	2,070	261	22	2.0
22	156	47	84	68	129	147	632	800	1,890	213	22	1.9
23	136	45	78	68	134	147	800	868	1,720	182	20	1.8
24	114	43	80	73	285	185	1,020	868	1,560	158	20	1.7
25	98	37	114	90	755	242	1,280	672	1,460	142	22	1.5
26	87	117	142	108	275	261	1,360	612	1,380	131	22	1.4
27	80	112	131	102	220	351	1,230	935	1,360	122	21	1.2
28	75	104	126	89	191	493	1,070	1,200	1,430	112	20	1.1
29	69	65	119	87	.....	548	800	1,300	1,300	100	17	1.0
30	64	61	112	89	.....	409	800	1,500	1,090	90	12	1.0
31	59	.....	108	84	.....	290	.....	1,660	.....	84	10	.....

NOTE.—Daily discharge Oct. 1 and 2 estimated by comparison with that of Tuolmne River below Hetch Hetchy dam site; May 13–15 estimated from graph sketched by field engineer from gage readings and familiarity with conditions; recorder out of order on those days.

Monthly discharge of Cherry Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	610	59	230	14,100
November	200	37	93.4	5,560
December	592	65	154	9,470
January	114	68	90.1	5,540
February	755	64	157	8,720
March	548	114	213	13,100
April	1,360	258	623	37,100
May	1,660	612	1,090	67,000
June	2,920	1,090	1,980	118,000
July	1,070	84	513	31,500
August	85	10	36.2	2,230
September	9.1	1.0	3.52	209
The year	2,920	1.0	431	313,000

ELEANOR CREEK NEAR SEQUOIA, CALIF.

LOCATION.—In SW. ¼ sec. 3, T. 1 N., R. 19 E., in Yosemite National Park, one-third mile below Lake Eleanor dam site, 1½ miles below Lake Eleanor, and 11 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—79 square miles [1] (above dam site in sec. 3, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—November 20, 1909, to September 30, 1917.

GAGE.—Lietz water-stage recorder in wooden house on reinforced concrete well on right bank. Previous to November 13, 1915, recorder was 1 mile upstream on right bank. Short distance upstream from that location was a vertical staff in two sections which was probably the original gage.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel of small boulders; control of large boulders, ledge, and concrete wall for low water. Zero flow is at stage 0.9 foot. Channel straight above and below. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.25 feet at 5 a. m. June 10 (discharge, 1,580 second-feet); minimum stage from water-stage recorder, 1.11 feet September 29 and 30 (discharge, 0.5 second-foot).

1910–1917: Maximum stage recorded, 13.1 feet January 30, 1911 (discharge, 5,000 second-feet); channel dry September 8 to 14, 1910.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent.

Discharge measurements of Eleanor Creek near Sequoia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	H. M. Stafford	3.12	161	May 16	H. M. Stafford	5.32	939
24	do	2.58	83	28	do	4.67	651
27	do	2.34	59	June 3	do	5.61	1,090
30	do	2.18	48	25	do	4.52	582
Nov. 9	do	2.46	72	30	do	4.21	466
25	do	2.10	43	July 26	do	2.52	79
Dec. 8	do	3.51	238	Aug. 16	do	1.69	16
Jan. 18	do	2.45	68	Sept. 10	C. J. Emerson	1.23	2.5
Feb. 27	do	3.78	317	17	do	1.20	1.5
Apr. 4	do	5.01	828	22	do	1.16	1.1
22	do	4.18	453	29	do	1.11	.6
25	do	5.36	1,040				

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Daily discharge, in second-feet, of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	40	55	105	81	257	351	675	980	430	43	5.6
2	231	36	62	108	82	226	315	652	1,060	412	40	5.1
3	354	32	80	108	82	205	282	652	1,180	409	37	4.7
4	339	31	196	105	85	188	309	745	1,150	398	34	4.5
5	297	35	384	99	92	180	402	898	1,090	381	32	4.3
6	262	41	430	97	101	188	545	952	1,120	360	30	4.1
7	249	48	327	92	106	192	675	1,010	1,210	348	27	3.7
8	223	58	252	90	112	194	820	980	1,300	336	24	3.3
9	203	68	203	86	118	194	720	1,040	1,470	327	22	3.1
10	188	84	172	84	122	184	549	980	1,470	300	20	2.7
11	190	101	150	85	126	176	473	980	1,150	270	19	2.7
12	196	106	137	86	125	162	565	870	980	254	18	2.7
13	194	105	129	85	120	155	561	1,040	898	244	18	2.7
14	188	96	119	84	116	150	505	1,270	980	228	18	2.5
15	178	86	115	81	113	140	434	1,300	1,010	211	16	2.3
16	167	79	109	75	113	137	370	1,010	1,040	200	15	2.1
17	158	72	105	72	118	134	321	898	1,040	192	13	2.1
18	152	66	98	69	118	134	285	820	1,010	182	13	2.1
19	142	61	93	69	120	137	265	698	925	169	12	1.9
20	131	54	91	68	132	144	279	569	898	153	11	1.7
21	115	50	90	67	156	156	339	513	845	140	11	1.5
22	106	47	90	65	180	160	477	517	795	123	11	1.4
23	93	44	94	64	196	160	608	553	698	109	10	1.4
24	84	41	106	63	257	163	820	585	652	96	10	1.2
25	75	38	112	63	348	178	1,040	565	585	84	9.7	1.0
26	68	40	119	64	370	200	1,180	493	553	75	9.2	.8
27	60	48	120	66	327	236	1,120	533	521	69	8.2	.6
28	54	52	116	69	285	324	980	652	513	63	7.7	.6
29	49	55	113	71	.....	448	770	770	505	58	7.3	.5
30	46	54	111	76	.....	481	652	845	462	52	6.6	.5
31	43	.....	106	80	.....	420	.....	925	.....	47	6.2	.....

Monthly discharge of Eleanor Creek near Sequoia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	354	18	157	9,650
November	106	31	58.9	3,500
December	430	55	145	8,920
January	108	63	80.5	4,950
February	370	81	154	8,550
March	481	134	207	12,700
April	1,180	265	567	33,700
May	1,300	493	806	49,600
June	1,470	462	936	55,700
July	430	47	217	13,300
August	43	6.2	18.0	1,110
September	5.6	.5	2.45	146
The year	1,470	.5	279	202,000

EVAPORATION FROM LAKE ELEANOR NEAR SEQUOIA, CALIF.

LOCATION.—In sec. 35, T. 2 N., R. 19 E., in Yosemite National Park, about 12 miles north of Sequoia, Tuolumne County.

RECORDS AVAILABLE.—February 27, 1915, to September 30, 1917.

EQUIPMENT.—Evaporation pan is 48 inches in diameter, 10 inches deep, hung by four turnbuckles in a raft of cedar logs. Raft is anchored about 1,000 feet from the nearest shore.

METHOD.—Observations are made several times a week by measuring the amount of water added to or taken from the pan in order to bring the water surface in the pan to the point of a metal cone set at its center. The water added or taken out is measured in a small can, the cubical content of which is known. Number of cans is reduced to depth in inches and that, corrected by the amount of precipitation, gives amount of evaporation.

ELEVATION.—About 4,700 feet above sea level.

Total evaporation in inches, since last day recorded, of Lake Eleanor near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	(a)					18	0.05				0.55
2		0.28			0.42	19		0.35	0.58	0.62	
3	0.15			0.74		20					.52
4					.64						
5	.22			.63		21			.59	.57	
						22	.14	.60			.48
6		.46			.44	23				.59	
7			1.56	.64		24		.41	.89		.44
8					.54	25	.06			b.39	.25
9				.70							
10			.48		.50	26			.60	.44	.22
						27		.59			
11			.54	.58		28			.63	.52	.40
12	.66	.92			.55	29	.13				
13	.17		.58	b.30		30		.62		.49	.36
14		.34			.51	31	.18		.82	.19	
15			b.54								
						Total for month..	2.14	5.09	8.35	8.75	7.37
16	.38			.74	.55						
17		.52	b.54	.52							

a Record started. b Estimated by engineer of U. S. Geol. Survey.

NOTE.—Record from Oct. 1 to Apr. 30 is too fragmentary and inaccurate to publish; it is from an improvised land pan.

SOUTH FORK OF TUOLUMNE RIVER NEAR SEQUOIA, CALIF.

LOCATION.—In NW. ¼ sec. 31, T. 1 S., R. 19 E., at highway bridge at Harden ranch, 600 feet above Hazel Green Creek, 1 mile above intake of Golden Rock ditch, and 3 miles west of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 11, 1914, to September 30, 1917.

GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read by employees of Yosemite Power Co.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shift during high water. Banks high but right bank may be overflowed at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet February 22 (discharge, determined from extension of rating curve, about 1,420 second-feet); minimum stage recorded, 1.35 feet September 19–23, 29–30 (discharge, 9 second-feet).

1914–1917: Maximum stage recorded, 8.0 feet at 7 a. m. and 5 p. m. January 25, 1914 (discharge determined from extension of rating curve, about 3,510 second-feet); minimum stage recorded, 1.20 feet during periods in the falls of 1914 and 1915 (discharge, 8.7 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 22. Rating curve used before change, well defined between 50 and 400 second-feet; only an extension above. Curve used after change well defined between 7 and 500 second-feet. Both curves the same above 1,220 second-feet. Gage read to half-tenths once daily from October 1 to May 7, and June 9 to July 28, and twice daily the rest of the year. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for discharge above 400 second-feet.

COOPERATION.—Gage-height record furnished by Yosemite Power Co.

Discharge measurements of South Fork of Tuolumne River near Sequoia, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	C. J. Emerson	1.62	30	June 17	C. J. Emerson	3.40	394
Dec. 12	do	1.69	31	July 3	do	2.14	86
May 2	do	3.02	282	Aug. 2	H. D. McGlashan	1.60	24
17	do	3.26	355				

Daily discharge, in second-feet, of South Fork of Tuolumne River near Sequoia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	70	20	34	30	44	189	147	332	367	94	28	10
2	160	20	39	34	39	128	189	405	405	94	24	10
3	70	20	44	34	39	128	213	405	405	80	24	10
4	44	20	50	34	39	128	213	367	405	80	24	10
5	26	34	50	34	39	128	213	367	405	80	20	10
6	26	26	50	34	44	128	239	446	426	80	18	10
7	26	26	39	34	44	94	239	446	446	66	17	10
8	26	26	39	34	44	94	239	386	625	66	17	10
9	26	26	39	34	50	94	239	386	367	66	17	10
10	26	26	39	34	50	94	268	386	332	66	17	10
11	26	26	39	34	50	110	268	405	332	53	17	10
12	26	23	39	39	50	110	300	350	332	53	17	10
13	30	23	39	39	56	110	332	426	332	53	17	10
14	30	23	34	39	70	110	332	510	300	53	17	10
15	30	23	34	39	70	110	268	510	300	42	17	10
16	30	20	30	39	63	94	268	386	268	42	17	10
17	26	20	30	39	56	94	239	405	268	42	17	10
18	26	20	30	39	56	94	189	367	239	42	17	10
19	26	20	30	39	56	94	167	316	239	42	14	9
20	30	20	30	39	102	94	167	268	239	38	14	9
21	30	20	30	39	470	110	167	268	213	38	14	9
22	30	20	30	39	1,420	110	167	268	213	33	14	9
23	30	20	30	39	1,160	94	239	284	167	33	14	9
24	34	20	30	39	1,020	94	332	284	167	33	14	10
25	20	20	26	39	905	94	367	254	147	28	10	10
26	20	30	26	39	675	119	367	226	128	28	10	10
27	20	30	30	39	446	128	350	254	128	28	10	10
28	20	30	30	39	332	147	350	300	110	24	10	10
29	20	26	30	39	.....	147	300	268	110	24	10	9
30	20	26	30	44	.....	147	268	300	94	24	10	9
31	20	.....	30	44	.....	147	.....	350	.....	24	10	.....

Monthly discharge of South Fork of Tuolumne River near Sequoia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	160	20	33.7	2,070
November	34	20	23.5	1,400
December	50	26	34.8	2,140
January	44	30	37.4	2,300
February	1,420	39	267	14,800
March	189	94	115	7,070
April	367	147	255	15,200
May	510	226	352	21,600
June	625	94	284	16,900
July	94	24	50.0	3,070
August	28	10	16.0	984
September	10	9	9.8	583
The year	1,420	9	122	88,100

SOUTH FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS,[1] CALIF.

LOCATION.—At South Fork trail bridge, in Stanislaus National Forest, one-fourth mile above Junction with Tuolumne River and about 2 miles northeast of Buck Meadows, Mariposa County. Middle Fork enters about 2½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 13, 1910, to September 30, 1917 (very fragmentary up to Sept. 30, 1916).

GAGE.—Stevens continuous water-stage recorder in masonry well and concrete house on right bank about 600 feet above trail bridge at same location and datum as inclined staff gage installed May 19, 1914. Previous to this date, gage was a vertical staff on middle pier of bridge at down stream end and at the same datum as present gage. Present gage installed November 4, 1916.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; very rough; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.7 feet at 7 p. m. February 21 (discharge, 3,010 second-feet); minimum stage from water-stage recorder, 2.44 feet September 21 (discharge, 7.0 second-feet).

1910–1917: Maximum stage recorded, between 8 and 10 feet January 25, 1914. A camper at the bridge said that on that date the water touched the under stringers of the footbridge (discharge not determined); minimum discharge recorded, 3 second-feet, September 15, 1913.

DIVERSIONS.—At Harden ranch, 7 miles above the mouth, water is diverted for use in vicinity of Groveland.

REGULATION.—A small amount of storage is developed at Harden ranch.

ACCURACY.—Stage-discharge relation has not changed in several years. Rating curve well defined. Mean daily gage height determined by averaging mean hourly gage heights. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Discharge measurements of South Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1917.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 8	3.20	41	June 1	5.75	779	June 30	4.47	224
May 9	5.60	694	5	5.94	888	July 20	3.42	62
16	5.75	753	13	5.79	797	Sept. 5	2.50	7.5
25	5.24	512	22	5.29	524			

[1] Formerly published as "near Groveland."

Daily discharge, in second-feet, of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	90	22	40	57	58	274	268	520	825	215	27	9.5
2	190	21	97	80	61	241	262	484	895	197	30	9
3	86	24	132	125	59	220	253	480	937	179	29	9.5
4	71	26	119	79	63	215	280	566	902	166	27	9
5	56	54	108	70	69	222	340	645	860	156	26	8
6	52	38	114	63	74	241	393	700	937	144	24	9
7	52	45	64	58	74	228	444	742	1,030	132	22	9
8	47	37	69	56	74	228	498	650	1,100	122	20	9
9	42	36	69	55	75	238	416	670	1,190	111	19	8.5
10	44	36	39	55	74	210	358	694	1,060	103	18	8.5
11	62	36	45	56	73	190	340	736	860	94	18	8.5
12	50	35	48	60	71	177	456	655	811	87	18	8.5
13	46	34	46	59	72	179	432	867	853	81	18	8.5
14	46	33	43	57	66	177	390	965	902	78	20	9
15	46	32	39	53	67	162	354	937	902	76	19	8.5
16	46	31	38	42	72	161	326	778	888	72	19	8
17	46	31	40	46	94	166	298	778	846	80	18	8
18	46	30	39	52	78	175	283	676	754	69	16	8
19	46	29	40	56	78	177	283	590	688	62	15	8
20	46	28	40	52	440	184	298	525	630	55	14	7.5
21	42	27	38	51	1,670	199	320	530	566	51	13	7
22	39	26	38	48	1,800	186	379	538	502	48	12	7.5
23	36	26	38	48	832	177	404	561	444	45	12	8
24	33	26	92	48	1,610	186	538	548	396	42	12	8
25	26	25	54	49	1,440	208	665	502	358	40	12	8
26	26	36	51	52	620	235	730	460	326	38	12	8
27	26	39	52	53	404	259	706	520	302	34	11	8
28	26	33	59	54	316	334	645	595	286	33	11	8
29	25	31	54	58	.....	393	507	552	259	31	11	8
30	24	30	52	72	.....	382	484	655	232	30	10	8
31	23	.....	58	64	.....	302	.....	736	.....	28	10	.....

NOTE.—No record for following dates: Oct. 4, 8, 15, 17, 18, 21–23, 26, 29–31, Nov. 1, 3 and 11–22, discharge interpolated; Oct. 1 and 2 estimated by comparison with record for other forks of Tuolumne River.

Monthly discharge of South Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	190	23	49.5	3,040
November	54	21	31.9	1,900
December	132	38	59.8	3,680
January	125	42	59.0	3,630
February	1,800	58	374	20,800
March	393	161	223	13,700
April	730	253	412	24,500
May	967	450	640	39,400
June	1,190	232	718	42,700
July	215	28	87.1	5,360
August	30	10	17.5	1,080
September	9.5	7	8.33	496
The year	1,800	7	221	160,000

MIDDLE FORK OF TUOLUMNE RIVER NEAR BUCK MEADOWS, CALIF.

LOCATION.—In NW. ¼ NW. ¼ sec. 28, T. 1 S., R. 18 E., 800 feet below Hog Ranch road highway bridge, half a mile above junction with South Fork of Tuolumne River and 4 miles east of Buck Meadows, Mariposa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1916, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from Hog Ranch road bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; channel straight for 100 feet above and for 200 feet below; one channel at all stages. Banks are fairly clean. Control is granite ledge across channel 100 feet below gage. Zero flow at stage 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 6.7 feet at 4 p. m. February 21 (discharge, 912 second-feet); minimum stage from water-stage recorder, 0.83 foot at 10 p. m. September 26 (discharge, 2.9 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 600 second-feet and extended above. Mean daily gage height determined by averaging mean hourly gage heights. Daily discharge ascertained by applying mean daily gage height to rating table or, for days of considerable range in stage, by averaging mean hourly discharge. Records excellent except for March, for 12 days of which discharge was estimated.

Discharge measurements of Middle Fork of Tuolumne River near Buck Meadows, Calif., during the year ending Sept. 30, 1917.

[Made by C. J. Emerson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 24	1.45	15	June 7	4.94	487	June 26	3.46	217
May 11	4.31	326	14	5.05	490	July 5	2.71	102
21	3.92	259	14	4.88	452	16	2.11	48
June 2	4.54	410	14	4.70	424	30	1.53	19
5	4.57	411	20	4.22	328	Sept. 6	.90	3.8

Daily discharge, in second-feet, of Middle Fork Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	22	23	24	92	86	225	444	136	19	4.6
2	.....	36	32	25	86	85	209	477	124	22	4.7
3	.....	42	47	24	82	82	209	510	116	20	4.4
4	.....	39	29	26	78	93	257	488	109	18	4.1
5	.....	42	26	27	83	112	290	466	101	16	3.6
6	.....	42	24	28	86	128	346	510	93	15	3.7
7	.....	28	24	27	82	141	343	582	84	13	3.7
8	.....	30	24	27	81	164	307	630	76	12	3.8
9	.....	25	23	28	85	140	325	678	71	11	4.0
10	.....	21	22	28	76	127	334	606	65	10	3.7
11	.....	22	22	29	69	127	352	499	60	10	3.7
12	.....	22	22	29	65	156	325	477	55	10	3.6
13	.....	21	22	30	65	153	422	510	53	9.8	3.6
14	.....	20	22	28	65	144	466	534	51	12	3.5
15	.....	18	21	28	60	133	455	546	52	11	3.2
16	.....	18	21	30	59	123	392	534	49	11	3.2
17	.....	19	20	36	61	113	392	510	59	10	3.0
18	.....	18	23	31	64	108	334	466	48	9.8	3.0
19	.....	20	22	32	65	106	298	433	42	8.2	3.0
20	.....	19	22	262	70	112	273	392	37	7.4	3.0
21	.....	18	21	595	75	120	282	352	34	7.2	3.0
22	.....	18	20	513	70	144	290	307	32	6.8	3.0
23	16	21	20	257	65	153	290	273	29	6.4	3.2
24	15	63	20	494	70	203	282	249	28	6.4	3.2
25	15	22	20	362	75	249	265	225	26	6.3	3.2
26	19	21	22	175	80	273	249	207	25	6.4	3.0
27	21	23	22	129	85	273	282	188	24	6.1	3.0
28	20	25	24	106	110	257	307	177	22	5.6	3.0
29	18	23	24	.....	125	207	298	161	22	5.2	3.2
30	17	24	27	.....	120	207	362	145	20	4.7	3.2
31	.....	24	25	.....	100	.....	412	.....	19	4.7	.....

NOTE.—No record Mar. 20-31; discharge estimated by comparison with records for South Fork of Tuolumne River and main stream near Buck Meadows.

Monthly discharge of Middle Fork of Tuolumne River near Buck Meadows, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
November 23-30	21	15	17.6	279
December	63	18	26.0	1,600
January	47	20	23.7	1,460
February	595	24	122	6,780
March	125	59	79.0	4,860
April	273	82	151	8,990
May	466	209	318	19,600
June	678	145	419	24,900
July	136	19	56.8	3,490
August	22	4.7	10.4	639
September	4.7	3.0	3.47	206
The period				72,800

YOSEMITE POWER CO.'S CANAL NEAR LA GRANGE, CALIF.

LOCATION.—In SW. ¼ sec. 16, T. 3 S., R. 14 E., at short flume opposite La Grange dam, just above waste gate, three-fourths mile above power house, 1¼ miles northeast of La Grange, Stanislaus County, and 13¾ miles below intake on Tuolumne River. Canal is on left bank of river.

RECORDS AVAILABLE.—1908 to September 30, 1917 (not complete).

GAGE.—Enameled vertical staff on right side of flume near upper end; read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made in flume just below gage.

CHANNEL AND CONTROL.—Rectangular ditch excavated mostly in shale rock.

EXTREMES OF DISCHARGE.—Maximum discharge recorded 1910–1917, 68 second-feet most of summer of 1916 and early part of 1917; no flow during parts of every year.

ACCURACY.—Stage-discharge relation changed by silting up of canal in February. Rating curve before and after change fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Turlock Irrigation District, through R. V. Meikle, chief engineer.

Yosemite Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, in the SW. ¼ sec. 6, T. 2 S., R. 15 E., about 15 miles above the town of La Grange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of La Grange, and is now locally known as the "La Grange mining ditch." Having been thoroughly repaired, it is used as a supply canal for the hydroelectric plant which was installed late in 1907. The power house is on the left bank of the river about half a mile above the town of La Grange and is below the dam and headworks of the Turlock and Modesto irrigation canals. Water diverted by canal is returned to river at power house.

The following discharge measurement was made by Charles Leidl:

March 25, 1917: Gage height, 2.76 feet; discharge, 62 second-feet.

Daily discharge, in second-feet, of Yosemite Power Co.'s canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	68	68	62	68	62	62	59	62	62	62	59
2	68	68	68	65	68	62	62	62	62	62	62	59
3	62	68	54	58	68	62	62	59	62	62	62	59
4	68	68	68	62	68	62	62	59	62	62	62	59
5	65	68	68	65	68	62	62	59	62	62	62	59
6	68	68	65	65	68	62	62	59	62	62	62	59
7	68	68	68	65	68	62	62	59	62	62	59	59
8	68	68	68	62	68	62	62	62	62	62	59	59
9	68	68	68	65	68	62	62	62	62	62	62	59
10	68	68	68	65	68	62	62	62	62	62	59	59
11	65	68	68	65	68	62	62	62	62	62	59	59
12	65	68	65	65	68	62	62	62	62	62	59	59
13	65	68	68	68	68	62	62	62	62	62	59	59
14	66	68	68	68	68	62	62	62	62	62	59	59
15	67	68	68	68	68	0	62	62	62	62	59	59
16	68	68	68	68	68	62	62	62	62	62	59	59
17	68	68	68	68	68	62	62	62	62	62	59	59
18	0	68	68	68	68	62	62	62	62	62	59	59
19	68	68	68	68	62	62	62	62	62	62	59	59
20	68	68	68	68	65	62	59	62	62	62	59	59
21	68	68	68	68	68	59	59	62	62	62	59	59
22	65	68	68	68	7.5	59	59	62	62	62	59	59
23	65	68	62	68	36	59	59	62	62	62	59	59
24	65	68	54	68	50	59	59	62	62	62	59	59
25	68	68	54	68	53	62	59	62	62	62	59	0
26	68	68	62	68	56	59	59	62	62	62	59	59
27	68	68	65	68	3.0	59	62	62	62	62	59	59
28	68	68	58	68	62	59	62	62	62	62	59	59
29	68	68	62	68	.....	0	62	62	62	62	59	59
30	68	68	62	68	.....	59	59	62	62	62	59	59
31	68	.....	65	68	.....	62	.....	62	.....	62	59	.....

NOTE.—No record Oct. 14, 15, 28, Jan. 11, and July 22; discharge interpolated.

Monthly discharge of Yosemite Power Co.'s canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	68	0.0	64.8	3,980
November	68	68	68.0	4,050
December	68	54	65.2	4.010
January	68	58	66.3	4,080
February	68	3.0	60.2	3,340
March	62	.0	57.2	3,520
April	62	59	61.2	3,640
May	62	59	61.4	3,780
June	62	62	62.0	3,690
July	62	62	62.0	3,810
August	62	59	59.7	3,670
September	59	.0	57.0	3,390
The year	68	.0	62.1	45,000

MODESTO CANAL NEAR LA GRANGE, CALIF.

LOCATION.—In SE. ¼ sec. 17, T. 3 S., R. 14 E., below waste gates and 460 feet below intake at La Grange dam on Tuolumne River, and 1¼ miles northeast of La Grange, Stanislaus County. Canal is on right bank of river.

RECORDS AVAILABLE.—April 26, 1903, to September 30, 1917.

GAGE.—Vertical iron staff in concrete well on left bank. Gage is read and operation of head gates noted by F. A. Townsend. Gage and its position have remained unchanged since beginning of record.

DISCHARGE MEASUREMENTS.—Made from footbridge 550 feet below gage.

CHANNEL AND CONTROL.—Canal is concrete lined and control is length of canal. For the last two years timber flumes that formed the canal a mile or more below the station have been gradually replaced by fills with concrete lining, and the cross section increased. The discharge per foot stage above 1.5 feet has been increased.

CAPACITY.—Maximum discharge 1903–1917, 954 second-feet part of summer of 1917; stage, 5.2 feet.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths twice daily and manipulation of gates noted. Daily discharge ascertained by applying mean daily gage height to rating table or by averaging results obtained by applying gage heights for parts of day to rating table. Records excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Modesto Irrigation District.

The water is used for irrigation in the Modesto Irrigation District.

Discharge measurements of Modesto canal near La Grange, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 7	P. F. Jones	2.01	300	Apr. 20	Jones and Atwater	5.01	948
25	.....do	4.01	718	July 25	Charles Leidl	2.41	372

Daily discharge, in second-feet, of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	6.5	9.8	6.5	.....	708	748	.....	954	954	226
2	6.5	9.8	2.0	.....	748	748	.....	954	954	267
3	6.5	9.8	2.0	.....	769	748	.....	954	954	246
4	4.7	9.8	2.0	.....	304	790	.....	954	954	226
5	.....	9.8	2.0	138	.....	810	317	954	954	205
6	.....	9.8	2.0	260	.....	810	708	954	954	195
7	.....	9.8	2.0	295	.....	830	912	954	954	171
8	.....	9.8	2.0	298	136	830	954	954	954	155
9	.....	9.8	1.1	298	438	851	954	954	954	133
10	.....	9.8	.....	298	605	872	954	954	954	120
11	.....	9.8	.....	298	708	872	954	954	954	116
12	.....	9.8	.....	298	708	872	954	954	954	109
13	.....	6.5	.....	287	708	872	954	954	954	106
14	.....	6.5	.....	287	708	872	954	954	954	112
15	.....	6.5	.....	277	605	892	954	954	954	104
16	.....	6.5	6.5	277	502	892	954	954	954	95
17	.....	6.5	.....	318	666	892	954	954	954	97
18	.....	6.5	.....	359	708	912	954	954	954	64
19	2.8	6.5	.....	348	708	912	954	954	954	.....
20	9.8	6.5	.....	626	708	912	954	954	769	.....
21	9.8	6.5	.....	666	708	933	954	954	666	.....
22	9.8	6.5	.....	708	708	933	954	954	564	.....
23	9.8	6.5	.....	708	708	933	954	954	502	.....
24	9.8	6.5	.....	708	708	954	954	954	441	.....
25	9.8	6.5	.....	708	708	954	954	954	400	.....
26	9.8	6.5	.....	708	708	954	954	954	380	.....
27	9.8	6.5	.....	708	708	954	954	954	338	.....
28	9.8	6.5	.....	425	708	954	954	954	338	.....
29	9.8	6.5	.....	.....	708	397	954	954	318	.....
30	9.8	6.5	.....	.....	708	.....	954	954	277	.....
31	9.8	.....	.....	.....	728	.....	954	.....	256	.....

NOTE.—No flow Oct. 5–18, Dec. 10–15, Dec. 17 to Feb. 4, Mar. 5–7, Apr. 30 to May 4, and Aug. 19 to Sept. 30.

Monthly discharge of Modesto canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	9.8	0.0	4.66	287
November	9.8	6.5	7.82	465
December	6.5	.0	.91	56
January	.0	.0	.0	0
February	708	.0	368	20,400
March	769	.0	589	36,200
April	954	.0	830	49,400
May	954	.0	801	49,300
June	954	954	954	56,800
July	954	256	754	46,400
August	267	.0	88.6	5,450
September	.0	.0	.0	0
The year	954	.0	366	265,000

TURLOCK CANAL NEAR LA GRANGE, CALIF.

LOCATION.—Close to north line of NW. ¼ NW. ¼ sec. 21, T. 3 S., R. 14 E., just below H. T. Sackett's house and barn, 2,400 feet below intake at La Grange dam and 1¼ miles northeast of La Grange, Stanislaus County. Canal is on left bank of Tuolumne River.

RECORDS AVAILABLE.—July, 1899, to September 30, 1917.

GAGE.—Float gage in 8-inch pipe on left bank, 150 feet below observer's house; read by H. T. Sackett. Previous gage, used until September 14, 1915, was float gage in well just below spillway and about 150 feet below intake tunnel.

DISCHARGE MEASUREMENTS.—Made from foot plank across lined section of canal at Snake Ravine about 1 mile below gage.

CHANNEL AND CONTROL.—Cut partly lined and fill completely lined. Control is length of channel.

EXTREMES OF DISCHARGE.—Maximum discharge recorded, 1,680 second-feet, June 5, 1916, and for several days in May, June, and July, 1917; no flow during periods of every year. Capacity of canal is about 1,800 second-feet.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily and regulation of head gate recorded. Daily discharge ascertained by applying gage height to rating table and weighting discharge according to duration. Records excellent.

COOPERATION.—Gage-height record and most of discharge measurements furnished by Turlock Irrigation District through R. V. Meikle, chief engineer.

The water is used to irrigate 95,698 acres of Turlock Irrigation District.

Discharge measurements of Turlock canal near La Grange, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 11	Turlock Irrigation District	7.91	1,680
June 21	....do	8.03	1,680
July 25	Charles Leidl	4.65	829

Daily discharge, in second-feet, of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			498		1,010	1,620	1,050	1,680	458	129
2			552		1,060	1,620	1,050	1,620	476	121
3			552		1,110	1,620	1,080	1,620	495	111
4			552	286	1,160	1,620	976	1,620	458	108
5			592	458	1,210	1,620	618	1,620	422	94
6			592	458	1,270	1,620	939	1,580	404	80
7	122		592	492	1,320	1,620	458	1,620	352	73
8	208		592	533	1,380	1,620	869	1,620	287	86
8	67		592	533	1,390	1,620	1,340	1,620	255	128
10			592	533	1,390	1,640	1,430	1,620	239	122
11			592	533	1,390	1,650	1,490	1,620	224	111
12			572	575	1,390	1,650	1,550	1,620	224	94
13			572	592	1,410	1,680	1,600	1,620	224	74
14			572	612	1,440	1,680	1,660	1,620	239	59
15			552	592	1,470	1,680	1,680	1,590	224	66
16			533	592	1,490	1,650	1,650	1,620	209	66
17			552	592	1,520	1,650	1,680	1,590	202	66
18			716	622	1,530	1,650	1,650	1,520	202	66
19			560	653	1,530	1,680	1,650	1,560	287	66
20			303	653	1,530	1,650	1,650	1,410	239	66
21			102	653	1,550	1,680	1,650	1,390	224	66
22				653	1,580	1,640	1,650	1,230	209	66
23				681	1,590	1,600	1,650	1,050	202	66
24				716	1,620	1,530	1,680	923	186	66
25				716	1,620	1,520	1,650	828	179	66
26				742	1,620	1,470	1,680	760	179	66
27				791	1,620	1,350	1,650	716	179	73
28		90		837	1,620	1,050	1,620	695	179	80
29		292		821	1,620	1,050	1,680	653	164	66
30		458		891	1,620	1,050	1,620	572	150	59
31		458		923		1,050		514	129	

NOTE.—No flow Oct. 1 to Dec. 6, Dec. 10 to Jan. 27, and Feb. 22 to Mar. 3.

Monthly discharge of Turlock canal near La Grange, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0	0	0.0	0
November	0	0	.0	0
December	208	0	12.8	787
January	458	0	41.9	2,580
February	716	0	405	22,500
March	923	0	572	35,200
April	1,620	1,010	1,440	85,700
May	1,680	1,050	1,540	94,700
June	1,680	458	1,420	84,500
July	1,680	514	1,330	81,800
August	495	129	261	16,000
September	129	59	82.0	4,880
The year	1,680	0	592	429,000

STANISLAUS RIVER AND TRIBUTARIES.

MIDDLE FORK OF STANISLAUS RIVER AT SAND BAR FLAT, NEAR AVERY, CALIF.

LOCATION.—At Sand Bar Flat, in Tuolumne County, 3 miles below Bakers Crossing, 11 miles above junction with North Fork of Stanislaus River, and 11 miles southeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 1, 1905, to September 30, 1917.

GAGE.—Staff showing depth of water over crest of dam. There is also a staff in flume below dam.

DISCHARGE.—Flow over dam is computed from formula developed by company. Current meter measurements are made in flume. Discharge, as published, is combined flow of river over dam and discharge of flume.

EXTREMES OF DISCHARGE.—Maximum daily discharge 1905–1917: 9,760 second-feet, March 19, 1907; minimum daily discharge, 50 second-feet, November 22, 1905.

ICE.—No information.

DIVERSIONS.—None.

REGULATION.—Relief reservoir (capacity, 16,000 acre-feet) on Relief Creek about a mile above mouth of the creek is used to store water.

COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Discharge measurements of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., during the year ending Sept. 30, 1917.

[Made by W. H. Hooker.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 14		1.5
19		8.1
27		2.1

NOTE.—Measurements made at a section 400 feet below dam.

Discharge measurements of Sierra & San Francisco Power Co.'s flume at Sand Bar Flat, near Avery, Calif., during the year ending Sept. 30, 1917.

[Made by W. H. Hooker.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Sept. 14	2.76	168	Sept. 19	4.08	287	Sept. 27	4.05	284
14	2.75	171	26	4.09	290	27	4.02	275
19	4.11	293	26	4.07	288	28	3.97	278

NOTE.—Records of discharge measurements from report by A. Griffin, chief engineer of South San Joaquin irrigation district.

Daily discharge, in second-feet, of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	222	245	241	242	258	522	800	2,160	2,840	2,040	672	270
2	437	243	260	229	376	481	804	2,000	2,940	2,060	609	214
3	260	246	275	353	345	468	909	1,980	3,270	2,020	545	243
4	225	234	583	287	275	488	1,130	2,290	3,230	1,980	540	243
5	210	205	431	278	236	506	1,450	2,490	3,130	1,900	502	242
6	230	216	461	282	368	544	1,630	2,640	3,240	1,790	466	243
7	225	246	332	218	401	547	1,820	2,900	3,410	1,850	417	245
8	236	232	288	228	358	583	2,160	2,590	3,820	1,850	373	203
9	240	232	244	347	269	527	1,730	2,920	4,270	1,710	349	169
10	253	239	194	269	316	462	1,570	2,880	4,230	1,590	292	174
11	254	219	234	262	325	469	1,610	3,050	3,510	1,480	280	186
12	241	206	253	263	283	440	1,890	2,710	3,160	1,460	277	187
13	246	192	234	259	261	427	1,740	3,270	3,130	1,420	270	207
14	224	211	246	248	301	415	1,650	3,780	3,320	1,480	272	162
15	223	260	250	253	303	350	1,390	3,630	3,490	1,630	296	187
16	242	289	234	401	257	371	1,250	2,960	3,510	1,780	366	302
17	250	278	233	410	371	389	1,120	2,900	3,690	1,560	349	307
18	231	214	241	435	363	402	1,050	2,470	3,560	1,410	299	288
19	211	229	258	431	308	419	1,020	2,050	3,410	1,290	296	270
20	216	249	261	378	422	434	1,110	1,820	3,410	1,190	275	276
21	240	260	243	352	606	485	1,230	1,920	3,220	1,080	284	273
22	248	231	241	396	792	458	1,580	1,990	3,010	907	274	265
23	233	243	253	346	565	464	1,900	1,980	2,790	827	273	272
24	224	245	440	310	1,010	480	2,340	1,980	2,620	716	267	274
25	251	209	202	259	1,180	536	2,870	1,830	2,440	612	314	277
26	247	259	210	372	829	596	3,070	1,640	2,270	581	272	276
27	250	260	382	375	660	641	2,890	1,960	2,190	617	266	272
28	247	254	358	407	561	949	2,710	2,210	2,370	613	264	266
29	210	223	312	355	.....	1,200	2,130	2,300	2,430	574	260	263
30	228	219	241	353	.....	1,050	2,050	2,570	2,130	556	253	264
31	239	.....	316	263	.....	894	.....	2,740	.....	539	251	.....

Monthly discharge of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	437	210	242	14,900
November	289	192	236	14,000
December	583	194	288	17,700
January	435	218	318	19,600
February	1,180	236	450	25,000
March	1,200	350	548	33,700
April	3,070	800	1,690	101,000
May	3,780	1,640	2,470	152,000
June	4,270	2,130	3,130	186,000
July	2,060	539	1,330	81,800
August	672	251	346	21,300
September	307	162	244	14,500
The year	4,270	162	941	681,500

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey from daily discharge record furnished by Sierra & San Francisco Power Co.

STANISLAUS RIVER NEAR KNIGHTS FERRY, CALIF.

LOCATION.—In SW. ¼ sec. 1, T. 1 S., R. 12 E., 300 feet above old Tulloch dam, 2 miles above Goodwin dam and 6 miles above Knights Ferry, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 18, 1915, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on right bank in reinforced concrete well and house. Previous to July 28, 1917, record is from a Gurley electric printing water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet upstream from gage or by wading.

CHANNEL AND CONTROL.—Bed composed of solid rock and shifting sand; straight for 250 feet above and 300 feet below; one channel at all stages. Control is Tulloch dam. Point of zero flow, gage height 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.11 feet at 3.45 a. m. February 21 (discharge, determined from extension of rating curve, 17,400 second-feet); minimum stage from water-stage recorder, 1.33 feet 8 to 10 p. m. November 10 (discharge, 213 second-feet).

1916–1917: Maximum stage recorded February 21, 1917; minimum stage recorded, 1.21 feet at 3 a. m. September 8 and 16 and 6 a. m. September 10, 1916 (discharge, 146 second-feet).

DIVERSIONS.—Ditches diverting water for hydraulic mining are numerous above the station. Water is also diverted from the South Fork into Tuolumne basin and from North Fork for use in the vicinity of Murphy and Angels (see Utica Gold Mining Co.'s canal near Avery). The water diverted for power development on Middle Fork at Sand Bar Flat near Avery is returned to river above this station.

REGULATION.—Storage is developed in Middle Fork (see Relief Creek near Baker Station), North Fork, and South Fork drainage basins.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 10,000 second-feet and extended above. Recorder not running during periods stated in footnote to daily discharge table. Mean daily gage height ascertained by averaging readings printed every fifteen minutes by the printing water-stage recorder and by an approximate method of integrating the graph made by the continuous water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent for periods for which recorder graph was obtained.

Discharge measurements of Stanislaus River near Knights Ferry, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 16	1.66	443	May 24	3.82	3,910
Mar. 23	2.19	986	July 29	1.75	533

Daily discharge, in second-feet, of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	215	288	307	510	515	1,950	1,950	4,500	6,240	2,720	488	268
2	1,500	281	533	475	479	1,710	1,890	4,040	6,600	2,670	551	268
3	1,400	288	739	1,980	497	1,450	1,820	4,040	7,200	2,460	497	262
4	320	281	1,710	930	479	1,340	2,050	4,720	7,200	2,300	438	255
5	314	320	1,730	800	488	1,230	2,610	5,420	6,480	2,190	438	288
6	309	334	1,380	625	551	1,310	3,260	5,890	6,480	2,150	376	274
7	303	355	864	550	579	1,280	3,690	6,710	7,200	2,090	390	268
8	298	341	697	520	598	1,320	4,500	6,220	7,920	2,010	355	281
9	292	327	542	550	542	1,460	3,800	6,470	9,160	1,800	348	268
10	287	249	533	490	570	1,620	3,170	6,360	9,410	1,600	314	264
11	281	320	500	450	560	1,350	3,130	6,590	6,960	1,460	327	260
12	341	327	450	462	560	1,250	3,920	5,880	6,120	1,460	307	257
13	314	307	410	506	542	1,200	3,690	6,710	5,760	1,400	255	253
14	314	320	380	542	542	1,380	3,370	8,350	6,360	1,340	320	249
15	307	274	355	470	506	1,160	2,910	8,820	6,720	1,550	300	255
16	274	307	334	398	542	1,080	2,550	7,060	6,840	1,780	327	255
17	294	307	335	376	588	1,040	2,280	6,710	6,960	1,620	341	288
18	294	307	335	376	579	1,080	2,030	6,010	6,960	1,430	341	355
19	300	314	340	488	718	1,080	1,890	5,640	6,240	1,250	255	369
20	300	274	350	488	4,380	1,120	1,950	4,130	6,240	1,140	314	362
21	294	300	355	479	13,200	1,200	2,250	3,800	5,760	1,090	281	362
22	294	294	362	470	11,900	1,160	3,090	3,690	5,300	912	300	355
23	262	294	525	430	5,180	1,030	3,800	3,920	4,610	800	294	362
24	281	307	1,480	390	7,200	1,080	4,840	4,040	4,150	680	288	341
25	288	307	905	390	8,410	1,190	6,120	3,580	3,800	542	288	355
26	281	348	575	376	5,780	1,340	6,960	3,110	3,580	542	288	320
27	281	341	525	454	3,150	1,450	6,360	3,580	3,280	542	281	314
28	288	362	625	446	2,440	1,910	5,760	4,380	3,310	488	294	334
29	288	355	650	479	.....	2,510	4,500	4,720	3,260	506	294	320
30	262	355	438	570	.....	2,610	4,150	5,530	3,000	488	274	314
31	288	.....	425	608	.....	2,250	.....	5,880	.....	488	262	.....

NOTE.—Discharge for periods when recorder was not running ascertained as follows: Oct. 1–4, Dec. 11 to Jan. 11, Mar. 13–22, May 6–20, July 10–27, estimated by comparison with Tuolumne River above La Grange dam near La Grange, except Oct. 4, Dec. 16, 22, 30, May 12, 19, July 18, 27, Sept. 9, 14, which was estimated from incomplete gage-height record; Oct. 5–10, Jan. 15, Feb. 26 and Sept. 10–13, interpolated.

Monthly discharge of Stanislaus River near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,500	215	367	22,600
November	362	249	313	18,600
December	1,730	307	632	38,900
January	1,980	376	551	33,900
February	13,200	479	2,570	143,000
March	2,610	1,030	1,420	87,300
April	6,960	1,820	3,480	207,000
May	8,820	3,110	5,370	330,000
June	9,410	3,000	5,970	355,000
July	2,720	488	1,400	86,100
August	551	255	336	20,700
September	369	249	299	17,800
The year	13,200	215	1,880	1,360,000

RELIEF RESERVOIR NEAR BAKER STATION, CALIF.

LOCATION.—Dam is in NW. ¼ sec. 13, T. 5 N., R. 20 E., on Relief Creek about five-eighths mile above junction with East Fork and 3½ miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1910, to September 30, 1917.

GAGE.—No information.

STORAGE.—Maximum storage recorded 1910–1917, 15,600 acre-feet, July 26, 1917.

COOPERATION.—Record showing daily storage, in cubic feet, furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

The reservoir is used for storage for power by Sierra & San Francisco Power Co. The water is released down Relief Creek to the Middle Fork of Stanislaus River at Sand Bar Flat, where it is diverted.

Storage, in acre-feet, in Relief reservoir near Baker Station, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13,600	12,400	8,690	6,880	3,580	3,140	3,230	.....	3,940	14,900	15,100	14,900
2	13,700	12,200	8,610	6,820	3,450	3,150	3,240	.....	4,610	14,900	15,100	14,900
3	13,900	11,900	8,570	6,710	3,340	3,170	3,080	.....	5,090	14,900	15,100	14,900
4	13,900	11,800	8,550	6,620	3,320	3,150	2,770	.....	5,650	14,900	15,000	14,900
5	13,900	11,700	8,560	6,480	3,250	3,150	2,500	.....	5,980	14,900	15,100	14,900
6	13,900	11,500	8,590	6,390	3,190	3,150	2,260	.....	6,340	14,900	15,100	14,900
7	13,900	11,400	8,620	6,390	3,170	3,160	2,050	.....	7,000	14,900	15,000	15,000
8	13,800	11,300	8,610	6,280	3,170	3,150	1,840	.....	7,500	14,900	15,000	14,900
9	13,800	11,200	8,570	6,160	3,140	3,150	1,580	.....	8,140	14,900	15,000	14,900
10	13,700	11,200	8,590	6,040	3,110	3,160	1,330	.....	8,780	14,900	15,000	14,900
11	13,700	11,200	8,510	5,930	3,100	3,160	1,030	.....	9,200	14,900	15,000	14,900
12	13,700	11,100	8,440	5,820	3,080	3,150	726	.....	9,530	14,900	14,900	14,900
13	13,700	11,100	8,320	5,700	3,060	3,150	448	.....	9,890	14,900	14,900	14,900
14	13,700	10,900	8,210	5,630	3,030	3,150	172	.....	10,400	14,900	14,900	14,900
15	13,800	10,600	8,110	5,510	3,020	3,150	.....	.....	10,700	15,000	15,000	14,700
16	13,800	10,400	8,080	5,370	3,010	3,150	.....	.....	11,300	15,000	15,000	14,400
17	13,800	10,300	8,060	5,220	2,970	3,140	.....	.....	11,800	15,000	15,000	14,200
18	13,900	10,200	7,990	5,080	2,960	3,140	.....	.....	12,400	14,900	15,000	13,600
19	13,900	10,100	7,900	4,940	2,930	3,130	.....	207	12,700	14,800	14,900	13,600
20	13,900	9,970	7,840	4,820	2,900	3,130	.....	389	13,000	14,700	14,900	13,400
21	13,800	9,770	7,780	4,720	2,930	3,130	.....	510	13,300	14,700	14,900	13,100
22	13,800	9,590	7,700	4,580	2,970	3,130	.....	784	13,500	14,700	14,900	12,800
23	13,700	9,440	7,570	4,560	3,000	3,120	.....	1,050	13,800	14,800	14,900	12,700
24	13,600	9,420	7,510	4,530	3,040	3,120	.....	1,180	13,900	14,800	14,900	12,200
25	13,400	9,330	7,510	4,440	3,070	3,120	.....	1,390	14,100	14,900	15,000	11,900
26	13,300	9,200	7,450	4,350	3,090	3,120	.....	1,540	14,500	15,600	15,000	11,600
27	13,100	9,090	7,290	4,200	3,100	3,120	.....	1,750	14,800	15,000	15,000	11,300
28	13,000	8,970	7,200	4,020	3,120	3,140	.....	2,100	15,100	15,000	15,000	11,100
29	12,900	8,890	7,080	3,900	.....	3,170	.....	2,440	15,200	15,100	15,000	10,800
30	12,700	8,840	6,970	3,800	.....	3,200	.....	3,270	14,900	15,100	14,900	10,500
31	12,500	.....	6,900	3,720	.....	3,230	.....	3,400	.....	15,100	14,900	.....

NOTE.—No record Feb. 21–24, 27, 28, Mar. 1, 9, 10, and July 18; storage interpolated. Reservoir empty Apr. 15 to May 18.

RELIEF CREEK NEAR BAKER STATION, CALIF.

LOCATION.—In NW. ¼ sec. 13, T. 5 N., R. 20 E., one-fourth mile below Relief reservoir of Sierra & San Francisco Power Co., one-fourth mile above junction with East Fork, and 3 miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October, 1910, to September 30, 1917 (incomplete).

GAGE.—No information.

DISCHARGE.—Computed from gage-height record at weir, which gives the combined flow over spillway and through outlet gates of dam.

EXTREMES OF DISCHARGE.—1912–1917: Maximum daily discharge recorded 795 second-feet, June 23, 1914; no flow April 9 to May 25 and June 24–28, 1913; no record April 18 to May 16, 1917; creek probably dry during part of this time.

ICE.—No information.

DIVERSIONS.—None.

REGULATIONS.—See Relief reservoir.

COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

The following discharge measurement was furnished by the Oakdale and South San Joaquin Irrigation District:

August 26, 1917: Gage height, 0.81 foot; discharge, 24 second-feet.

Daily discharge, in second-feet, of Relief Creek near Baker Station, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	107	88	13	96	11	11	.....	10	341	81	11
2	32	107	46	65	70	11	11	.....	10	341	76	11
3	31	107	27	65	70	11	197	.....	104	346	74	10
4	31	76	15	44	15	11	195	.....	164	338	69	12
5	31	55	15	86	51	11	195	.....	166	348	65	12
6	72	75	15	54	30	11	192	.....	169	346	64	14
7	58	92	15	54	16	11	186	.....	195	358	58	18
8	71	51	15	93	10	11	197	.....	222	346	42	17
9	55	83	15	68	25	11	214	.....	282	341	40	15
10	71	15	15	68	25	11	208	.....	310	341	38	13
11	35	43	36	68	15	11	212	.....	409	294	40	13
12	20	15	36	68	15	11	206	.....	378	308	38	28
13	20	44	87	68	25	11	194	.....	409	222	41	31
14	20	142	57	51	25	11	166	.....	257	269	40	28
15	20	136	37	74	15	11	40	.....	257	302	54	152
16	40	136	37	79	25	11	39	.....	369	364	52	141
17	19	51	27	79	25	11	38	321	343	364	50	141
18	15	33	52	79	25	11	.....	233	440	342	39	141
19	13	52	52	79	25	11	.....	10	490	321	38	141
20	46	100	43	79	25	11	.....	11	557	282	27	141
21	67	114	43	79	25	11	.....	10	629	233	26	141
22	67	93	54	78	25	11	.....	8	399	321	25	141
23	58	59	74	9	12	11	.....	8	409	294	25	141
24	98	45	15	60	12	11	.....	8	352	70	23	141
25	98	74	52	60	12	11	.....	8	274	49	26	141
26	98	74	52	9	12	11	.....	8	182	28	25	141
27	98	75	114	99	12	11	.....	8	212	63	23	141
28	98	54	87	98	12	11	.....	9	372	78	22	141
29	56	63	63	74	.....	11	.....	9	437	79	22	151
30	98	34	63	54	.....	11	.....	9	378	79	22	151
31	98	.....	28	74	.....	11	.....	9	.....	76	12	.....

NOTE.—Quantities changed slightly to conform to computation rules of U. S. Geological Survey. No record Apr. 18 to May 16; creek probably dry during part of this time. No record Feb. 21–24, 27, 28, Mar. 1, 9, 10, July 18 and 25; discharge interpolated.

Monthly discharge of Relief Creek near Baker Station, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	98	13	54.1	3,330
November	142	15	73.5	4,370
December	114	15	44.4	2,730
January	99	9	65.4	4,020
February	96	10	26.8	1,490
March	11	11	11.0	676
April 1–17	214	11	147	4,960
May 17–31	321	8	44.6	1,330
June	629	10	303	18,000
July	364	28	254	15,600
August	81	12	41.2	2,530
September	152	10	84.0	5,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

NORTH FORK OF STANISLAUS RIVER NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 700 feet above intake of Utica Gold Mining Co.'s canal and about 5 miles northeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1917.

GAGE.—Vertical staff in two sections on right bank; read by James Hunter.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage, or by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; appear permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 2 p. m. April 30 (discharge, 2,450 second-feet); minimum stage recorded, 1.2 feet October 25–26 (discharge, 47 second-feet).

1914–1917: Maximum stage recorded, 8.7 feet May 11, 1915 (discharge, 5,250 second-feet); minimum stage recorded, 1.0 foot November 10–21, 1915 (discharge, 34 second-feet).

DIVERSION.—Water is diverted from Beaver Creek into the North Fork about half a mile above the station.

REGULATION.—A small amount of storage is developed on the headwaters of this stream.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 4,000 second-feet. Gage read to half-tenths once on alternate days except during October, November, and half of December when read once daily. Daily discharge ascertained by applying gage height to rating table. Records good except for some uncertainty due to regulation at low stages.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

Discharge measurements of North Fork of Stanislaus River near Avery, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 11	2.67	223
July 12	2.69	201

Daily discharge, in second-feet, of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	77	66	108	81	126	295	545	1,790	2,060	545	66	73
2	94	59	295	a85	a130	a273	a545	1,400	a2,200	a507	a66	73
3	126	59	396	89	133	251	545	a1,400	2,350	469	66	a73
4	108	70	545	a94	a137	a258	a738	1,400	a2,350	a450	a70	73
5	98	73	295	98	141	265	930	a1,400	2,350	431	73	a73
6	98	81	265	103	a145	a258	990	1,400	a2,250	a396	a73	73
7	89	81	251	a103	149	251	a1,020	a1,360	2,150	361	73	a73
8	89	89	212	103	158	a244	1,050	1,320	a2,100	a328	a73	73
9	81	94	a172	a103	a158	237	a1,020	a1,320	2,060	295	73	a73
10	85	98	133	103	158	a230	990	1,320	a2,010	265	a73	73
11	89	89	120	a103	a163	224	a960	a1,360	1,960	224	73	a73
12	81	89	120	103	168	a218	930	1,400	a1,920	224	a73	73
13	73	89	120	a103	168	212	a990	a1,400	1,880	a201	73	a73
14	73	89	120	103	a158	a212	1,050	1,400	a1,840	178	a73	73
15	73	85	120	a103	149	212	a990	a1,400	1,790	a214	73	a73
16	73	85	120	103	a149	a238	930	1,400	a1,740	251	73	73
17	66	81	108	a103	149	265	a780	a1,400	1,700	a232	a72	a73
18	66	77	a103	103	168	a280	630	1,400	a1,660	212	70	73
19	66	73	98	a103	b232	295	a780	a1,320	1,620	a190	a70	a70
20	59	66	a94	103	295	a312	930	1,250	a1,580	168	70	66
21	59	59	89	a103	b336	328	a1,160	1,320	1,540	a138	a70	a66
22	56	59	a89	103	378	a380	1,400	a1,360	a1,470	108	70	66
23	53	62	89	a103	b400	431	a1,680	1,400	1,400	a103	a72	a66
24	53	62	89	103	488	a488	1,960	a1,440	a1,320	98	73	66
25	47	66	a87	a103	b510	545	a2,160	1,470	1,250	a92	a73	a66
26	47	62	85	103	431	a610	2,350	a1,500	a1,120	85	73	66
27	59	62	a83	a103	b340	675	a2,350	1,540	990	73	a73	a66
28	66	70	81	103	295	a675	2,350	a1,580	a855	a70	73	66
29	73	77	a81	108	.....	675	a2,400	1,620	720	66	a73	a66
30	73	77	81	a108	.....	a652	2,450	a1,620	630	66	73	66
31	73	.....	73	108	.....	630	.....	1,620	.....	a66	a73	.....

a Interpolated. b From a hydrograph of the storm period.

Monthly discharge of North Fork of Stanislaus River near Avery, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	126	47	74.9	4,610
November	98	59	75.0	4,460
December	545	73	152	9,350
January	108	81	101	6,210
February	510	126	229	12,700
March	675	212	359	22,100
April	2,450	545	1,250	74,400
May	1,790	1,250	1,430	87,900
June	2,350	630	1,700	101,000
July	545	66	229	14,100
August	73	66	71.7	4,410
September	73	66	70.3	4,180
The year	2,450	47	477	345,000

UTICA GOLD MINING CO.'S CANAL NEAR AVERY, CALIF.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., about 450 feet below headworks on North Fork of Stanislaus River and 5 miles northeast of Avery, Calaveras County.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1917.

GAGE.—Enameled vertical staff gage, installed May 19, 1915, on right side of flume; read by James Hunter. Previous to May 19, 1915, a vertical staff gage was located 300 feet above and on the right bank. It was too near the headgate and could not be properly rated.

DISCHARGE MEASUREMENTS.—Made from footplank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.65 feet May 19, 1915 (discharge, 116 second-feet).

ICE.—Stage-discharge relation may be affected by ice.

ACCURACY.—Stage-discharge relation changed; not affected by ice during year. Rating curve well defined. Gage read to half-tenths once a day except January to September, when it was read on alternate days. Daily discharge ascertained by applying daily gage height to rating table. Discharge for days on which gage was not read estimated the same as on previous day up to July 12 and interpolated after that date. Records good.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

Discharge measurements of Utica Gold Mining Co.'s canal near Avery, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 11	1.25	75
12	1.23	71

Daily discharge, in second-feet, of Utica Gold Mining Co.'s canal near Avery, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	66	66	74	66	70	70	84	84	84	84	57	70
2	74	66	74	a 66	a 70	a 70	a 84	84	a 84	a 84	b 57	70
3	84	66	84	66	70	70	84	a 84	84	84	57	b 70
4	84	66	74	a 66	a 70	a 70	a 84	84	a 84	a 84	b 62	70
5	84	70	70	66	70	74	88	a 84	84	84	66	b 70
6	84	70	70	66	a 70	a 74	88	84	a 84	a 84	b 66	70
7	84	70	70	a 66	70	74	a 88	a 84	84	84	66	b 70
8	79	74	70	66	70	a 74	88	84	a 84	a 84	b 68	70
9	79	74	a 70	a 66	a 70	74	a 88	a 84	84	84	70	b 70
10	79	79	70	66	70	a 74	88	84	a 84	84	b 70	70
11	79	74	70	a 66	a 70	74	a 88	a 84	84	74	70	b 70
12	70	74	70	66	70	a 74	88	84	a 84	84	b 70	70
13	70	74	70	a 66	70	79	a 88	a 84	84	b 68	70	b 70
14	70	74	70	66	a 70	a 79	88	84	a 84	53	b 70	70
15	70	70	70	a 66	70	79	a 88	a 84	84	b 68	70	b 70
16	70	70	70	66	a 70	a 79	84	84	a 84	84	70	70
17	66	70	70	a 66	70	79	a 84	a 84	84	b 82	b 68	b 70
18	61	70	a 70	66	70	a 79	84	84	a 84	79	66	70
19	61	70	70	a 66	a 70	79	a 84	a 84	84	b 79	b 66	b 68
20	61	66	a 70	66	70	a 79	84	84	a 84	79	66	66
21	61	66	70	a 66	a 70	79	a 84	84	84	b 76	b 66	b 66
22	61	66	a 70	66	70	a 79	a8	a 84	a 84	74	66	66
23	61	66	70	a 66	a 70	79	a 88	84	84	b 72	b 68	b 66
24	53	66	66	66	70	a 79	88	a 84	a 84	70	70	b 66
25	46	66	a 66	a 66	a 70	84	a 88	84	84	b 68	b 70	66
26	46	66	66	66	70	a 84	88	a 84	a 84	66	70	57
27	61	66	a 66	a 66	a 70	84	a 88	84	84	61	b 70	b 57
28	61	70	66	66	70	a 84	88	a 84	a 84	b 59	70	57
29	66	70	a 66	66	.....	84	a 88	84	84	57	b 70	b 57
30	66	74	66	a 66	.....	a 84	88	a 84	84	57	70	57
31	66	.....	66	66	.....	84	.....	84	.....	b 57	b 70	.....

a Estimated same as preceding day.

b Interpolated.

Monthly discharge of Utica Gold Mining Co.'s canal near Avery, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	84	46	68.5	4,210
November	79	66	69.6	4,140
December	84	66	69.8	4,290
January	66	66	66.0	4,060
February	70	70	70.0	3,890
March	84	70	77.7	4,780
April	88	84	86.7	5,160
May	84	84	84.0	5,160
June	84	84	84.0	5,000
July	84	53	74.4	4,570
August	70	57	67.3	4,140
September	70	57	67.0	3,990
The year	88	46	73.7	53,400

SOUTH FORK OF STANISLAUS RIVER AT STRAWBERRY,[1] CALIF.

LOCATION.—In SE. ¼ sec. 17, T. 4 N., R. 18 E., at site of former Sonora-Bridgeport State highway bridge at Strawberry, Tuolumne County, a summer resort in Stanislaus National Forest, 1½ miles below mouth of Herring Creek and 15 miles northeast of Confidence.

DRAINAGE AREA.—About 54 square miles.

RECORDS AVAILABLE.—October 20, 1911, to January 31, 1917, when station was discontinued.

GAGE.—Vertical staff on left bank fastened to abutment of former bridge about 30 feet above suspension footbridge. Gage read by an employee of Sierra & San Francisco Power Co. Original gage, which was at the same place, was torn out when the bridge was removed August 31, 1914. A temporary gage was used until October 10 and the old gage was reinstalled October 14. Original datum has probably not been maintained.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; appear permanent. Left bank is about 20 feet high; right bank is lower but probably is not subject to overflow.

EXTREMES OF DISCHARGE.—1911–1917: Maximum stage recorded, 5.4 feet at 4 p. m. June 8, 1915 (discharge, 1,450 second-feet); minimum stage recorded, 1.15 feet November 2 and 3, 1912 (discharge, 3 second-feet).

ICE.—Stage-discharge relation is probably slightly affected by ice.

DIVERSIONS.—None above.

REGULATION.—The flow is partly regulated by three reservoirs which have been constructed above the station to supply Tuolumne and Sonora with water for domestic use. This water is diverted about 10 miles below the station.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 900 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

[1] Formerly published as "near Confidence."

Discharge measurements of South Fork of Stanislaus River at Strawberry, Calif., during the year ending Sept. 30, 1917.

Date.	Gage height	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 17	2.03	89	Aug. 28	1.91	72
20	2.00	82	31	1.88	66

NOTE.—Records of discharge measurements furnished by Oakdale and South San Joaquin irrigation districts.

Daily discharge, in second-feet, of South Fork of Stanislaus River at Strawberry, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Day.	Oct.	Nov.	Dec.	Jan.
1	46	48	75	109	16	48	48	83	100
2	51	48	75	109	17	48	68	83	100
3	48	48	83	109	18	48	91	83	100
4	42	48	58	109	19	48	91	91	109
5	42	48	37	100	20	48	91	91	109
6	42	54	28	100	21	48	95	91	109
7	48	54	28	100	22	48	91	91	105
8	48	48	28	100	23	48	83	91	109
9	48	48	28	100	24	48	75	91	109
10	51	48	37	100	25	48	61	83	109
11	54	48	48	100	26	48	54	83	109
12	54	48	54	100	27	48	48	91	109
13	54	48	39	100	28	48	48	100	109
14	54	48	46	100	29	48	48	100	109
15	48	48	75	100	30	48	61	100	100
					31	48	.....	100	100

Monthy discharge of South Fork of Stanislaus River at Strawberry, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	54	42	48.3	2,970
November	95	48	59.5	3,540
December	100	28	70.7	4,350
January	109	100	104	6,390
The period	.....	.....	.....	17,200

SOUTH SAN JOAQUIN CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—At footbridge three-fourths mile below headgate at Goodwin dam, on Stanislaus River 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1917. Also miscellaneous measurements and roughly approximate estimates for 1913.

GAGE.—Vertical staff in gage well on left bank; read by B. A. Collins. Original gage was inclined staff on right bank 100 feet below; and probably at the same datum. Present gage put in operation March 12, 1915.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and is concrete lined.

[1] Also known as Main Supply canal.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.2 feet June 23, 1915; discharge, 871 second-feet.

ACCURACY.—Stage-discharge relation was changed during storm of February 19–26 when canal gates were closed. Old and new rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Daily gage-height record furnished by South San Joaquin Irrigation District through A. Griffin, chief engineer.

The water is used for irrigation in the Oakdale and South San Joaquin districts. South San Joaquin canal is on the right bank of the river.

Discharge measurements of South San Joaquin canal near Knights Ferry, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 23	2.02	94	May 23	5.46	475
23	2.93	185	24	6.94	648
23	4.04	314			

Daily discharge, in second-feet, of South San Joaquin canal near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	243	85	72	58	72	0	598	562	658	658	318	158
2	265	90	62	58	95	0	610	562	658	658	399	158
3	270	85	62	0	120	76	634	562	658	658	399	147
4	287	90	58	0	120	132	646	610	658	658	318	147
5	287	90	58	49	120	180	658	634	658	658	353	169
6	199	90	58	49	120	238	670	646	646	658	284	147
7	188	90	58	49	120	284	682	670	646	658	318	147
8	188	85	58	58	130	307	682	658	658	658	284	147
9	166	80	58	58	130	10	670	670	658	682	284	147
10	166	80	58	58	130	307	658	670	658	670	330	147
11	166	80	58	58	130	318	658	670	658	658	238	147
12	166	80	58	58	130	364	670	670	634	658	226	158
13	155	80	58	58	130	342	670	670	634	658	169	158
14	105	80	58	58	130	284	670	682	658	658	250	147
15	125	80	58	58	130	284	658	682	658	658	226	147
16	150	80	58	58	177	284	658	658	646	670	238	147
17	150	80	58	58	199	284	658	658	658	658	250	147
18	140	80	58	58	243	284	658	658	658	658	261	226
19	130	80	58	58	155	284	658	658	658	658	180	238
20	130	76	58	58	90	284	658	658	658	646	215	226
21	120	72	58	58	0	284	658	658	658	658	215	238
22	120	72	58	72	0	318	658	658	658	646	215	226
23	120	58	58	72	0	353	658	622	670	634	204	238
24	120	58	67	72	0	376	682	634	658	586	192	215
25	120	58	67	72	0	399	694	646	658	538	192	261
26	125	58	67	72	0	422	694	658	658	399	180	238
27	125	58	67	72	0	445	694	658	550	399	180	215
28	125	80	67	72	0	468	682	658	491	422	192	250
29	135	80	67	72	.....	514	670	658	574	410	180	238
30	135	80	58	72	.....	538	622	658	634	376	169	238
31	85	.....	58	72	.....	562	.....	658	.....	399	147	.....

Monthly discharge of South San Joaquin canal near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	287	85	162	9,960
November	90	58	77.8	4,630
December	72	58	60.5	3,720
January	72	0	57.9	3,560
February	243	0	95.4	5,300
March	562	0	298	18,300
April	634	598	661	39,300
May	682	562	648	30,800
June	670	491	643	38,300
July	682	376	602	37,000
August	399	147	245	15,100
September	261	147	187	11,100
The year	694	0	312	226,000

OAKDALE CANAL[1] NEAR KNIGHTS FERRY, CALIF.

LOCATION.—On lot 2, near northwest corner of SE. ¼ SE. ¼ sec. 10, T. 1 S., R. 12 E., about 1,700 feet below head gate at Goodwin dam, on Stanislaus River 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 3, 1914, to September 30, 1916. Also miscellaneous measurements and roughly approximate estimates for 1913.

GAGE.—Staff in well on left bank about 1,700 feet below head gate; installed April 29, 1916. Until April 28, 1916, gage was a staff gage in well on left bank about 800 feet below head gate. Original gage was inclined staff at same location and datum as first well gage. Gage read by J. R. Ozment.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and side walls are concrete.

EXTREMES OF DISCHARGE.—1914–1917: Maximum stage recorded, 5.05 feet in June and July, 1917 (discharge, 213 second-feet); no flow during periods of each year.

ACCURACY.—Stage-discharge relation was changed by the repairs made during the fall shutdown. Rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Oakdale Irrigation District, through Burton Smith, chief engineer.

Oakdale canal is on left bank of the river. The water is used for irrigation in the Oakdale district.

Discharge measurements of Oakdale canal near Knights Ferry, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 22	0.98	25	May 22	3.20	113	May 22	4.11	163
May 22	2.39	79	May 22	3.98	152	May 22	5.03	213

[1] Also known as South Main canal.

Daily discharge, in second-feet, of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	104	.....	.....	145	175	210	210	145	65
2	114	.....	.....	155	186	70	210	175	61
3	90	.....	.....	160	186	53	210	175	61
4	90	.....	.....	165	186	204	210	135	57
5	90	.....	.....	165	186	210	210	135	65
6	86	.....	.....	160	192	210	153	120	59
7	90	23	.....	160	186	210	158	145	57
8	90	32	.....	165	186	210	210	115	57
9	90	32	.....	165	198	210	210	120	61
10	90	41	.....	160	198	210	210	165	59
11	90	50	.....	160	198	210	210	100	59
12	90	50	.....	165	192	210	210	85	61
13	90	57	.....	160	198	210	210	65	61
14	68	65	.....	160	198	210	210	95	59
15	.....	65	.....	160	210	210	210	85	57
16	.....	65	.....	155	210	210	210	90	57
17	.....	65	.....	155	210	210	210	95	61
18	.....	65	.....	155	204	210	210	100	95
19	.....	22	.....	155	158	210	210	57	100
20	.....	.....	.....	170	0	210	210	81	95
21	.....	.....	.....	175	93	210	210	77	95
22	.....	.....	.....	180	170	210	210	81	95
23	.....	.....	.....	180	180	210	210	77	105
24	.....	.....	.....	180	175	210	198	69	90
25	.....	.....	.....	180	175	210	204	69	110
26	.....	.....	.....	52	210	210	175	65	100
27	.....	.....	.....	48	210	210	175	69	90
28	.....	.....	.....	145	210	210	186	77	105
29	.....	.....	31	140	210	210	180	77	105
30	.....	.....	85	165	210	210	160	69	100
31	.....	.....	105	.....	210	.....	175	57	.....

NOTE.—Canal dry Oct. 15 to Feb. 6 and Feb. 20 to Mar. 28.

Monthly discharge of Oakdale canal near Knights Ferry, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	114	0	41.0	2,520
November	0	0	.0	0
December	0	0	.0	0
January	0	0	.0	0
February	65	0	22.6	1,260
March	105	0	7.1	437
April	180	48	155	9,220
May	210	0	184	11,300
June	210	53	200	11,900
July	210	153	199	12,200
August	175	57	99.0	6,090
September	110	57	76.7	4,560
The year	210	0	82.2	59,500

CALAVERAS RIVER AT JENNY LIND, CALIF.

LOCATION.—In SE. ¼ sec. 22, T. 3 N., R. 10 E., at highway bridge on Milton road about one-fourth mile southeast of Jenny Lind, Calaveras County, and 27 miles above junction with San Joaquin River. North and South forks unite about 15 miles above station.

DRAINAGE AREA.—395 square miles.

RECORDS AVAILABLE.—January 1 to June 30, 1907; December 1, 1907, to June 30, 1908; November 1, 1908, to September 30, 1917.

GAGE.—Vertical staff in two sections. High-water section is on downstream end of middle pier of bridge; low-water section is underneath bridge on right bank. Read by P. F. Sinclair.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at noon January 21 (discharge, from extension of rating curve, about 42,800 second-feet); no flow in river August 6 to September 5.

1907–1917: Maximum stage recorded, 14.0 feet 7 a. m. January 31, 1911 (discharge, from extension of rating curve, about 69,600 second-feet); stage was higher about midnight; no flow July 22 to November 17, 1913; October 1 to 12, 1914; August 5 to September 9, 1915; and August 6 to September 5, 1917.

DIVERSIONS.—A small amount of storage is developed at Salt Springs Valley for use in connection with dredging operations below Jenny Lind.

ACCURACY.—Stage-discharge relation changed February 21. Rating curve before change fairly well defined between 10 and 1,000 second-feet and extended above. Curve after change well defined below 2,000 second-feet and extended above. Gage read to tenths once daily; during floods oftener. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record during the high-water season, December to June, is furnished by the United States Weather Bureau through N. R. Taylor, meteorologist.

Discharge measurements of Calaveras River at Jenny Lind, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec. ft.*
Jan. 21	−1.00	86	Feb. 28	0.39	1,130	Apr. 14	−0.66	312
21	−1.00	92	28	.39	1,110	May 30	−1.09	97

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	34	34	49	295	243	1,460	287	540	137	40	0.7
2	34	34	49	410	196	1,460	287	540	137	23	.4
3	34	34	695	6,020	118	1,460	287	540	96	23	.4
4	49	34	243	1,670	118	1,460	287	475	96	23	.4
5	49	34	410	1,070	118	1,460	287	475	96	23	.4
6	49	34	615	1,070	118	1,460	287	475	96	23	.....
7	49	34	470	470	118	1,460	287	410	96	23	.....
8	49	49	350	615	89	1,460	345	410	96	23	.....
9	49	49	243	615	89	1,460	540	410	96	10	.....
10	49	49	243	615	89	1,460	540	410	65	10	.....
11	49	49	243	540	89	540	540	410	65	10	.....
12	49	49	196	470	89	770	540	410	65	10	.....
13	49	49	196	470	89	770	345	345	65	10	.....
14	49	49	196	470	89	770	345	345	65	10	.....
15	49	49	196	470	89	690	345	345	65	10	.....
16	49	49	154	410	89	690	345	345	65	1.3	.....
17	49	49	118	410	154	690	345	345	65	1.3	.....
18	49	49	49	410	410	540	345	287	65	1.3	.....
19	49	49	49	350	410	540	345	287	65	1.3	.....
20	49	49	49	350	615	540	345	287	65	1.3	.....
21	34	49	49	350	34,400	475	410	235	65	1.3	.....
22	34	49	49	295	28,800	475	410	235	40	1.3	.....
23	34	49	49	295	6,020	410	410	235	40	1.3	.....
24	34	49	1,530	295	7,390	410	410	235	40	.7	.....
25	34	49	695	295	6,020	345	410	185	40	.7	.....
26	34	49	695	295	3,950	345	475	185	40	.7	.....
27	34	49	695	243	1,710	287	475	185	40	.7	.....
28	34	49	695	243	1,460	287	475	185	40	.7	.....
29	34	49	295	243	.....	287	475	137	40	.7	.....
30	34	49	196	243	.....	287	540	121	40	.7	.....
31	34	.....	295	243	.....	287	.....	137	.....	.7	.....

NOTE.—No flow Aug. 6 to Sept. 5. Discharge Sept. 6–30 estimated at 1.3 second-feet, from measurement made on Oct. 12, 1917, and by comparison with records of flow for Middle Fork of Mokelumne River at West Point.

Monthly discharge of Calaveras River at Jenny Lind, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	49	34	42.2	0.107	0.12	2,590
November	49	34	45.5	.115	.13	2,710
December	1,530	49	324	.820	.95	19,900
January	6,020	243	653	1.65	1.90	40,200
February	34,400	89	3,330	8.43	8.78	185,000
March	1,460	287	808	2.05	2.36	49,700
April	540	287	392	.992	1.11	23,300
May	540	121	328	.830	.96	20,200
June	137	40	69.5	.176	.20	4,140
July	40	.7	9.26	.023	.03	569
August	.7	.0	.07	.00018	.0002	4.3
September	.....	.0	1.08	.0027	.003	64.3
The year	34,400	.0	481	1.22	16.54	348,000

MOKELUMNE RIVER AND TRIBUTARIES.

NORTH FORK OF MOKELUMNE RIVER NEAR WEST POINT, CALIF.

LOCATION.—In NW. ¼ sec. 17, T. 7 N., R. 15 E., 9½ miles northeast of West Point, on county line between Calaveras and Amador counties. Blue Creek enters 1 mile below and Bear Creek 4 miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28 to September 30, 1917.

GAGE.—Staff gage in two sections on right bank about 500 feet below Bruce's Camp; read by G. C. Bruce.

DISCHARGE MEASUREMENTS.—Made from cable at the gage.

CHANNEL AND CONTROL.—Channel is wide and smooth above the gage and rough with a steep gradient below the gage; permanent. Both banks high and not subject to overflow. Zero flow, gage height 2.4 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.4 feet at 7.20 p. m. June 9 (discharge, 7,290 second-feet); minimum stage recorded, 4.3 feet September 1, 2, 24–30 (discharge, 80 second-feet).

DIVERSION.—None.

REGULATION.—A small amount of storage in Blue Lakes is used by Pacific Gas & Electric Co. during periods of low water and augments the natural flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined by 15 current-meter measurements made in 1918. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage-height to rating table. Records good for low water; fair for high water because of the considerable daily fluctuation during the period of snow run-off.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1,440	3,750	1,220	160	80	16	.....	2,580	4,560	1,690	150	116
2	.....	1,360	3,750	1,290	150	80	17	.....	2,370	4,700	1,220	141	93
3	.....	1,290	3,750	980	141	93	18	.....	1,780	4,840	980	150	100
4	.....	1,970	3,880	1,220	141	93	19	.....	1,600	4,280	925	141	100
5	.....	2,370	4,010	1,040	141	93	20	.....	1,360	4,010	770	150	100
6	.....	2,470	4,280	1,040	141	100	21	.....	1,290	3,500	680	141	100
7	.....	3,020	4,420	925	141	108	22	.....	1,440	3,260	640	141	108
8	.....	2,370	5,580	870	141	108	23	.....	1,780	2,580	565	141	108
9	.....	2,910	6,490	870	150	108	24	.....	1,690	2,470	565	141	86
10	.....	2,800	4,840	725	160	108	25	.....	1,440	2,270	460	141	80
11	.....	3,260	4,140	565	160	108	26	.....	1,290	1,970	426	141	80
12	.....	2,370	3,260	443	180	108	27	.....	1,970	1,780	160	124	80
13	.....	3,620	4,140	394	150	116	28	2,580	2,800	1,440	141	124	80
14	.....	3,260	4,840	640	141	124	29	1,870	3,020	1,600	141	141	80
15	.....	3,620	4,560	680	160	124	30	1,600	3,580	1,290	132	141	80
							31	.....	3,620	.....	150	116	.....

Monthly discharge of North Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 28–30	2,580	1,600	2,020	12,000
May	3,620	1,290	2,310	142,000
June	6,490	1,290	3,670	218,000
July	1,690	132	727	44,700
August	180	116	145	8,920
September	124	80	98.1	5,840
The period	.....	.....	.....	431,000

MOKELUMNE RIVER NEAR CLEMENTS, CALIF.

LOCATION.—In NW. ¼ sec. 15, T. 4 N., R. 8 E., at highway bridge about 1 mile north of Clements, San Joaquin County. Cosumnes River enters about 19½ miles below station. North and Middle forks of Mokelumne unite about 35 miles above Clements.

DRAINAGE AREA.—631[1] square miles.

RECORDS AVAILABLE.—October 28, 1904, to September 30, 1917.

GAGE.—Staff in four sections at bridge; No. 1 is vertical and fastened to pile on right bank; No. 2 is inclined, directly back of No. 1; No. 3 is vertical and bolted to middle pier near downstream end; No. 4 is vertical and bolted to left abutment near downstream end. Gage is read by Mrs. J. S. Hodges.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel, and somewhat shifting. Right bank is high and not subject to overflow. Left bank is overflowed above stage 15 feet, for a distance of 200 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet at 8 a. m. February 25 (discharge, 6,660 second-feet); minimum stage recorded, 2.3 feet during parts of September (discharge, 85 second-feet).

1904–1917: Maximum stage recorded, 17.45 feet January 30, 1911 (discharge, 16,700 second-feet); minimum stage recorded, 2.5 feet October 3 to 5, 1912 (discharge, 23 second-feet).

[1] Supersedes area published in previous reports.

DIVERSIONS.—Several small ditches divert water for mining and irrigation above the station. Power is developed on the North Fork and part of the water is diverted outside of the drainage.

REGULATION.—Flow is partly regulated by storage developed on the headwaters of the North Fork.

ACCURACY.—Stage-discharge relation changed during March. Rating table before change fairly well defined; rating table after change well defined between 60 and 4,000 second-feet and fairly well defined above and below. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, or by shifting-control method. Records good.

Discharge measurements of Mokelumne River near Clements, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec-ft.*		*Feet.*	*Sec-ft.*		*Feet.*	*Sec-ft.*
Dec. 1	3.10	226	Feb. 27	6.48	2,090	July 23	2.89	228
1	3.08	225	Apr. 13	6.55	2,430			
Jan. 20	3.35	304	May 29	7.86	3,440			

Daily discharge, in second-feet, of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	132	132	210	329	329	1,270	1,320	2,770	4,570	1,600	186	125
2	430	144	472	329	225	1,070	1,260	2,620	4,790	1,740	160	115
3	472	121	750	1,080	225	930	1,300	2,470	5,730	1,600	160	85
4	274	156	1,510	650	274	880	1,270	2,770	5,130	1,460	160	95
5	182	144	1,440	472	196	860	1,510	3,250	4,790	1,390	172	85
6	156	257	1,080	560	292	890	1,920	3,330	4,790	1,460	125	85
7	182	225	855	430	292	840	1,980	3,940	5,490	1,320	172	85
8	257	210	538	274	292	870	2,720	3,570	5,970	1,180	186	136
9	144	210	388	240	257	990	2,360	3,840	6,870	1,050	160	85
10	240	210	368	274	274	910	2,000	3,940	7,550	930	172	95
11	225	210	274	257	329	910	1,910	4,350	4,790	870	172	85
12	210	240	368	274	329	810	2,430	3,750	4,140	810	186	95
13	196	210	292	257	310	790	2,470	4,460	4,350	695	147	95
14	210	210	310	310	310	900	2,170	5,970	5,250	930	172	105
15	240	182	310	274	292	880	2,020	5,730	5,850	750	172	105
16	225	182	274	210	240	790	1,740	3,750	5,730	930	172	95
17	257	196	274	182	274	770	1,670	3,750	5,490	810	172	105
18	225	182	196	257	368	800	1,600	3,250	5,250	750	172	95
19	240	169	292	292	329	800	1,320	2,770	4,570	565	125	105
20	156	182	196	310	605	880	1,460	2,320	4,790	386	115	95
21	169	196	274	274	3,690	880	1,600	2,320	4,140	328	147	105
22	144	196	257	240	5,660	860	1,880	2,470	3,940	310	136	95
23	156	196	292	274	2,460	840	2,620	2,620	3,090	246	147	95
24	156	196	388	274	3,790	820	3,090	2,700	2,850	246	125	85
25	169	196	494	210	6,400	740	3,750	2,470	2,620	246	147	85
26	169	196	348	225	3,310	830	4,570	2,170	2,700	216	136	85
27	144	240	257	196	2,090	1,000	4,140	2,400	2,020	200	105	85
28	121	274	348	210	1,630	1,340	3,750	3,090	2,020	200	125	85
29	169	240	292	182	.....	1,580	3,090	3,250	2,020	200	136	85
30	196	225	257	274	.....	1,780	2,620	4,140	1,810	136	125	85
31	144	.....	310	494	.....	1,470	.....	4,350	.....	172	125	.....

NOTE.—Shifting-control method used Feb. 28 to Apr. 12.

Monthly discharge of Mokelumne River near Clements, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 631 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	472	121	206	0.326	0.38	12,700
November	274	121	198	.314	.35	11,800
December	1,510	196	449	.712	.82	27,600
January	1,080	182	326	.517	.60	20,000
February	6,400	196	1,250	1.98	2.06	69,400
March	1,780	740	967	1.53	1.76	59,500
April	4,570	1,260	2,250	3.57	3.98	134,000
May	5,970	2,170	3,370	5.34	6.16	207,000
June	7,550	1,810	4,440	7.04	7.86	264,000
July	1,740	136	765	1.21	1.40	47,000
August	186	105	152	.241	.28	9,350
September	136	85	95.4	.151	.17	5,680
The year	7,550	85	1,200	1.90	25.82	868,000

MIDDLE FORK OF MOKELUMNE RIVER AT WEST POINT, CALIF.

LOCATION.—In sec. 10, T. 6 N., R. 13 E., above highway bridge 1 mile south of West Point, Calaveras County, 1½ miles below mouth of Bear Creek and 3½ miles above junction with the South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 9, 1911, to September 30, 1917.

GAGE.—Vertical staff in two sections, fastened to trees on right bank, 1,000 feet above bridge; read by C. H. Spink.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage, or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.8 feet February 21 (discharge, 1,240 second-feet); minimum stage recorded, 2.75 feet September 19–21, 24 (discharge, 4.9 second-feet).

1911–1917: Maximum stage recorded, 10 feet at 4 p. m. January 23, 1914 (discharge, 2,550 second-feet); minimum stage recorded, 2.48 feet at 1 p. m. August 15, 1913 (discharge, 2.8 second-feet).

ICE.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—Mokelumne Hill and Valley Springs ditch (capacity about 6 second-feet) diverts about 2 miles above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed. Rating curve well defined below 900 second-feet and is an extension above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The following discharge measurement was made by Charles Leidl:

April 26, 1917: Gage height, 5.12 feet; discharge, 291 second-feet.

Daily discharge, in second-feet, of Middle Fork of Mokelumne River near West Point, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	31	12	25	34	38	155	140	210	155	35	12	5.5
2	34	12	74	38	36	140	132	200	155	34	12	5.5
3	20	12	118	97	34	132	125	190	155	32	12	5.5
4	16	12	170	53	34	125	140	200	155	32	12	5.5
5	14	34	85	60	34	118	155	210	148	31	12	5.5
6	15	19	72	50	34	111	170	220	148	31	10	5.5
7	38	20	46	42	34	111	190	220	148	31	10	5.5
8	18	18	38	38	36	111	240	230	148	28	9	5.5
9	16	16	31	36	36	118	210	230	148	28	9	5.5
10	16	15	26	34	36	118	190	230	140	25	8.5	6
11	16	15	25	34	38	118	210	230	125	25	8.5	6
12	16	15	25	34	38	111	315	230	111	25	8.5	6
13	15	15	24	34	37	104	190	230	97	22	8.5	6
14	15	15	22	34	35	111	210	230	91	22	8.5	5.5
15	14	14	20	34	35	104	230	220	85	20	8.5	5.5
16	13	13	20	34	46	104	210	210	85	20	8.5	5.5
17	13	13	20	34	46	104	190	220	85	19	8.5	5.5
18	13	12	20	55	46	104	170	210	74	19	8.5	5.5
19	12	12	19	64	55	104	162	190	69	18	8.5	4.9
20	12	12	19	34	240	104	155	170	64	16	8	4.9
21	12	12	19	34	965	97	155	170	60	16	7	4.9
22	12	12	21	33	680	97	180	162	55	15	6.5	5.5
23	12	12	22	31	395	91	210	162	55	14	6	5.5
24	12	12	74	30	920	91	250	155	50	13	6	4.9
25	12	12	38	29	715	97	250	148	50	12	6	6
26	12	26	38	28	425	104	270	140	46	12	6	6
27	12	18	38	28	270	118	290	140	46	12	6	6
28	12	17	34	27	210	132	290	155	46	11	6	5.5
29	12	16	31	46	.....	155	230	155	42	12	6	5.5
30	12	15	31	74	.....	155	220	155	38	12	5.5	5.5
31	12	.....	34	40	.....	148	.....	155	.....	12	5.5	.....

Monthly discharge of Middle Fork of Mokelumne River at West Point, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	38	12	15.8	972
November	34	12	15.3	910
December	170	19	41.3	2,540
January	97	27	41.1	2,530
February	965	34	198	11,000
March	155	91	116	7,130
April	315	125	203	12,100
May	230	140	193	11,900
June	155	38	95.8	5,700
July	35	11	21.1	1,300
August	12	5.5	8.31	511
September	6.5	4.9	5.54	330
The year	965	4.9	78.5	56,900

SOUTH FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CALIF.

LOCATION.—In sec. 34, T. 6 N., R. 14 E., at Laidet ranch, about 5 miles above mouth of Licking Fork and 5 miles east of Railroad Flat, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to September 30, 1917.

GAGE.—Vertical staff fastened to alder tree on right bank 100 feet above suspension footbridge; read by C. M. Laidet.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; seldom shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 8.30 a. m. February 25 (discharge, 945 second-feet); minimum stage recorded, 1.30 feet September 16 (discharge, 6.5 second-feet).

1911–1917: Maximum stage recorded, 6.9 feet at 4.20 p. m. January 25, 1914 (discharge, 3,330 second-feet); minimum discharge recorded, 3.9 second-feet September 18, 1916.

ICE.—Stage-discharge relation may be slightly affected by ice at times.

DIVERSIONS.—An irrigation and power ditch of about 2 second-feet capacity diverts at base of Blue Mountain, above station. Some water is also used for irrigation at Laidet ranch.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation did not change during year; not affected by ice. Rating curve well defined below 600 second-feet and extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records for medium stages excellent; rest good.

The following discharge measurement was made by Charles Leidl:

April 29, 1917: Gage height, 2.65 feet; discharge, 241 second-feet.

Daily discharge, in second-feet, of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	21	9	17	20	22	137	154	221	143	44	15	7
2	31	8.5	60	27	20	114	123	217	143	42	15	7
3	14	8.5	72	42	18	103	121	204	135	40	14	7
4	12	8	190	31	19	99	128	154	135	39	13	7
5	12	18	74	38	19	99	148	224	128	38	13	8
6	16	17	47	12	19	94	184	238	123	36	13	8
7	18	14	44	17	21	93	210	246	123	36	13	8
8	13	12	38	19	22	92	246	249	119	36	13	8.5
9	12	11	33	18	22	90	217	246	119	33	13	9
10	12	11	29	19	23	97	197	253	119	33	13	9
11	12	11	28	20	31	92	190	238	103	31	12	9
12	12	9.5	25	19	29	88	306	238	94	30	13	8
13	11	8.5	12	17	28	78	246	242	89	30	13	8
14	11	8.5	12	17	26	78	253	256	83	29	12	8
15	10	9	13	18	25	80	221	238	83	27	12	8
16	9.5	9	13	19	29	82	197	210	78	27	12	6.5
17	9.5	9	13	19	34	83	171	221	78	24	12	10
18	9	8.5	13	22	29	83	148	217	72	24	11	9
19	9	9	13	22	38	83	148	204	69	24	11	8
20	8.5	9	13	24	72	83	143	193	61	24	11	8
21	8	8	14	13	363	86	146	178	58	24	11	8.5
22	9	8	13	13	755	84	156	171	56	24	10	9.5
23	8.5	8	16	14	242	83	162	187	56	22	10	10
24	8.5	8.5	49	14	330	83	184	174	54	22	14	10
25	9	10	36	14	880	86	242	171	50	22	11	9
26	9	33	28	14	475	92	322	165	51	22	9	9
27	9	24	22	13	268	99	306	162	49	22	7	9
28	8.5	16	20	13	184	117	302	159	47	20	7	8.5
29	9	13	19	18	.....	151	238	148	44	18	9	8.5
30	9	12	17	31	.....	159	228	148	44	16	9	8
31	9	.....	21	22	.....	159	.....	143	.....	16	8	.....

NOTE.—No record Nov. 14–15, Jan. 25, Mar. 7, July 29, and Aug. 17–18; discharge interpolated.

Monthly discharge of South Fork of Mokelumne River near Railroad Flat, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	31	8	11.6	713
November	33	8	11.6	690
December	190	12	32.7	2,010
January	42	12	20.0	1,230
February	880	18	144	8,000
March	159	78	98.6	6,060
April	322	121	201	12,000
May	256	143	204	12,500
June	143	44	86.9	5,170
July	44	16	28.2	1,730
August	15	7	11.6	713
September	10	6.5	8.37	498
The year	880	6.5	70.9	51,300

LICKING FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CALIF.

LOCATION.—In E. ½ SE. ¼ sec. 26, T. 6 N., R. 14 E., at Mokelumne forest-ranger station, 100 feet above mouth of Big Canyon Creek and 6½ miles east of Railroad Flat, Calaveras County. Licking Fork joins South Fork 6 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to December 17, 1917 (incomplete), when the station was discontinued.

GAGE.—Vertical staff spiked to an alder tree two feet in diameter, on left bank about 140 feet above ranger station. Gage read by employees of United States Forest Service. Previous to June 4, 1915, gage was located on left bank 160 feet above and at different datum.

DISCHARGE MEASUREMENTS.—Made from foot log near gage, or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; rough and fairly permanent. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 3.22 feet at 7.15 p. m. April 25 (discharge, 51 second-feet); minimum stage recorded, 1.79 feet at 6.45 p. m. August 3 (discharge, 0.7 second-foot).

1911–1917: Maximum stage recorded, 2.4 feet January 25, 1914; minimum stage recorded, 0.25 foot June 1 to 10, 1914 (discharges unknown). Both referred to old gage datum.

DIVERSION.—An irrigation ditch, having a capacity of 1 second-foot, heads above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation did not change during year. Rating curve well defined below 40 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent when gage is read.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Licking Fork of Mokelumne River near Railroad Flat, Calif., during the period Oct. 1, 1916, to May 19, 1918.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
1917.		
April 29	3.00	33
Oct. 14	1.80	.8
1918.		
May 19	2.23	4.8

Daily discharge, in second-feet, of Licking Fork of Mokelumne River near Railroad Flat, Calif., for the period Oct. 1, 1916, to Dec. 17, 1917.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Oct.	Nov.	Dec.
1	3.8	.....	28	a 10	4.1	2.3	.....	1.4	3.8
2	2.3	.....	27	a 10	3.8	1.7	.....	a 1.8	a 3.5
3	a 2.0	.....	27	a 10	3.9	.7	.....	2.2	3.2
4	1.7	.....	28	a 9	3.8	1.4	.....	2.4	3.0
5	a 1.8	.....	a 29	a 9	3.7	1.5	.....	2.7	2.8
6	a 1.9	.....	a 30	a 8	3.7	1.6	.....	3.6	2.8
7	a 2.0	.....	31	a 8	3.6	1.4	.....	3.1	2.7
8	a 2.1	.....	27	8	3.6	1.7	.....	2.8	a 2.7
9	2.2	.....	28	7	3.6	1.6	.....	a 2.9	a 2.7
10	a 2.2	.....	28	a 7	3.4	1.7	.....	a 3.1	2.7
11	a 2.2	.....	27	a 7	2.7	1.7	.....	a 3.3	2.7
12	2.3	43	27	a 7	2.7	1.6	.....	3.4	2.6
13	a 2.3	40	a 26	a 6.5	3.0	1.7	.....	3.2	2.6
14	a 2.3	36	24	6.5	3.7	1.7	.....	3.1	a 2.6
15	a 2.3	31	22	6.5	3.7	1.7	.....	3.0	2.6
16	2.3	28	20	a 6	2.8	1.6	.....	3.0	2.6
17	.....	26	20	6	2.8	.....	.....	3.0	2.7
18	.....	23	19	6	3.1	.....	.....	3.0	.....
19	.....	21	17	a 5.5	3.1	.....	.....	a 3.0	.....
20	.....	21	16	5	a 2.4	.....	.....	a 3.0	.....
21	.....	a 25	16	5	1.6	.....	.....	3.0	.....
22	.....	a 30	a 16	5	2.5	.....	1.2	2.8	.....
23	.....	35	a 15	5.5	2.6	.....	1.1	2.8	.....
24	.....	43	15	5	1.8	.....	1.0	2.8	.....
25	.....	51	a 14	a 5	2.2	.....	1.0	3.0	.....
26	.....	47	a 14	a 5	2.2	.....	.8	3.0	.....
27	.....	46	a 13	4.9	2.2	.....	1.2	3.1	.....
28	.....	39	12	4.8	3.1	.....	a 1.4	3.2	.....
29	.....	33	a 12	3.8	2.6	.....	1.6	3.2	.....
30	.....	30	a 11	4.1	2.2	.....	1.5	3.2	.....
31	.....	.....	a 11	.....	2.2	.....	1.4	.....	.....

a No record; discharge interpolated.

NOTE.—No gage-height record on days for which discharge is not given.

Monthly discharge of Licking Fork of Mokelumne River near Railroad Flat, Calif., for the period Oct. 1, 1916, to Dec. 17, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1916.				
October 1–16	3.8	1.7	2.23	70.8
1917.				
April 12–30	51	21	34.1	1,290
May	31	11	21.0	1,290
June	10	3.8	6.54	389
July	4.1	1.6	2.98	183
August 1–16	2.3	.7	1.60	50.8
October 22–31	1.6	.8	1.22	24.2
November	3.6	1.4	2.90	173
December 1–17	3.8	2.6	2.84	95.8

NORTH FORK OF COSUMNES RIVER NEAR ELDORADO, CALIF.

LOCATION.—In sec. 23, T. 9 N., R. 10 E., at suspension footbridge at Gelio's ranch,[1] 4 miles above junction with Middle Fork and 5 miles south of Eldorado, Eldorado County. Martinez Creek enters about 1½ miles above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 13, 1911, to September 30, 1917.

GAGE.—Staff in three sections on right bank at the bridge; read by James Yates. A temporary gage was used August 13 to September 23, 1911, at same location; datum 1.0 foot higher.

[1] "Kings Store" on map of Placerville quadrangle U. S. Geol. Survey.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet at 6 p. m. February 22 (discharge, 4,150 second-feet); minimum stage recorded, 2.9 feet October 31, September 1–12, 19–21 (discharge, 3.5 second-feet).

1911–1917: Maximum stage recorded, 14.2 feet January 25, 1914 (discharge, from extension of rating curve, about 6,930 second-feet); minimum stage recorded, 2.85 feet August 19 to September 9, and September 14–17, 1914 (discharge, 2 second-feet).

ICE.—Stage-discharge relation very slightly, if at all, affected by ice.

DIVERSIONS.—The J. J. Crawford ditch diverts from Camp Creek, above the station. This is a small ditch, about 2 feet wide. The water is used for irrigation below Placerville.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet and extended above. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good.

Discharge measurements of North Fork of Cosumnes River near Eldorado, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 29	3.65	54
29	3.65	55

Daily discharge, in second-feet, of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	23	39	106	130	785	528	785	454	a 99	17	3.5
2	130	23	215	528	114	528	490	695	454	92	14	3.5
3	85	23	a 412	528	114	528	490	695	a 448	85	14	a 3.5
4	49	23	610	149	a 114	454	490	a 718	a 442	78	14	3.5
5	39	85	568	308	a 114	418	568	740	436	72	14	3.5
6	39	49	528	215	114	401	695	785	418	a 66	11	3.5
7	54	49	215	169	122	384	785	830	454	60	11	3.5
8	a 46	49	191	a 142	130	384	925	785	454	a 54	11	3.5
9	39	39	149	114	130	490	925	830	490	49	11	a 3.5
10	44	a 39	130	114	130	528	785	975	454	49	8.2	a 3.5
11	49	39	a 114	106	130	454	740	830	352	49	8.2	3.5
12	39	34	99	99	130	418	1,620	830	352	49	a 6.8	3.5
13	34	30	85	99	130	418	1,140	875	352	49	5.5	4.5
14	30	30	85	99	130	418	1,080	975	337	44	5.5	4.5
15	a 30	30	85	99	130	368	925	695	322	39	a 5.5	4.5
16	a 30	30	78	a 102	130	a 368	b 716	652	322	39	5.5	4.5
17	30	30	72	106	169	368	b 640	610	a 322	39	5.5	a 4.2
18	30	30	72	99	191	352	568	568	322	34	4.5	a 3.8
19	34	a 30	72	99	240	352	528	528	322	30	4.5	3.5
20	23	a 30	66	99	149	a 368	528	490	322	30	4.5	3.5
21	23	30	60	85	1,750	384	528	490	240	30	5.5	3.5
22	23	30	60	a 78	4,150	a 353	652	490	215	a 26	5.5	4.5
23	23	30	b 140	72	1,480	322	785	472	191	23	5.5	5.5
24	23	30	925	72	2,180	308	925	472	169	23	5.5	5.5
25	23	30	418	72	3,720	322	875	454	159	23	4.5	8.2
26	23	85	114	72	b 1,860	352	1,190	418	149	20	4.5	11
27	a 23	85	99	72	1,020	352	1,140	418	136	20	4.5	11
28	23	72	130	85	975	490	1,080	418	122	17	3.9	11
29	23	54	122	99	.....	568	925	418	a 114	a 17	3.9	11
30	23	44	114	191	.....	740	785	418	106	17	3.9	11
31	23	.....	114	191	.....	610	.....	418	.....	17	3.5	.....

a Interpolated. b Estimated.

Monthly discharge of North Fork of Cosumnes River near Eldorado, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	130	20	36.4	2,240
November	85	23	40.2	2,390
December	925	39	199	12,200
January	528	72	144	8,850
February	4,150	114	710	39,400
March	785	308	438	26,900
April	1,620	490	802	47,700
May	975	418	638	39,200
June	490	106	314	18,700
July	99	17	43.2	2,660
August	17	3.5	7.48	460
September	11	3.5	5.24	312
The year	4,150	3.5	278	201,000

COSUMNES RIVER AT MICHIGAN BAR, CALIF.

LOCATION.—In NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., at highway bridge at Michigan Bar, Sacramento County, 5½ miles southwest of Latrobe. North and Middle forks unite 12 miles above station.

DRAINAGE AREA.—524 square miles.

RECORDS AVAILABLE.—October 20, 1907, to September 30, 1917.

GAGE.—Vertical staff on downstream end of bridge pier, near left bank; read by C. B. Ruman.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and small boulders; fairly permanent. Stage of zero flow, gage height, 1.4 feet ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.0 feet at midnight February 21 (discharge, 22,900 second-feet); minimum stage recorded, 2.00 feet August 24 to September 25 (discharge, 6.0 second-feet).

1907–1917: Maximum stage recorded, 11.0 feet February 21, 1917 (discharge, 22,400 second-feet); minimum stage, river dry July 25 to September 16, 1908.

DIVERSIONS.—Douglas and Enterprise ditches, which have a combined capacity of about 50 second-feet, divert from the Middle and South forks. The water is used for power, domestic, and irrigation supplies at Plymouth and vicinity. Slug Gulch ditch—capacity of 7 or 8 second-feet—also diverts water from the Middle fork when prior appropriations permit. Michigan Bar canal, which has a capacity of about 50 second-feet, heads on the main Cosumnes at Musicdale Creek. No record is available showing the amount of water that is diverted.

REGULATION.—Flow is partly regulated by diversions.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 6 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for low water, which are good.

Discharge measurements of Cosumnes River at Michigan Bar, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 27	3.27	200
27	3.25	195

Daily discharge, in second-feet, of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10	39	80	250	282	1,620	1,050	1,340	760	203	27	6.0
2	80	39	362	320	250	1,340	950	1,220	805	175	22	6.0
3	182	39	850	1,340	210	1,100	950	1,160	805	160	20	6.0
4	109	39	1,410	560	210	1,000	850	1,160	805	120	20	6.0
5	77	51	950	460	210	950	1,000	1,220	760	120	20	6.0
6	64	132	1,000	850	218	850	1,100	1,280	760	120	20	6.0
7	70	120	560	492	250	850	1,340	1,280	760	120	20	6.0
8	109	109	400	372	250	850	1,620	1,280	805	116	17	6.0
9	84	80	345	305	250	1,280	1,550	1,410	805	98	14	6.0
10	78	78	250	272	250	1,550	1,410	1,410	760	98	14	6.0
11	80	64	210	250	250	1,160	1,280	1,280	718	89	14	6.0
12	80	64	210	250	282	1,000	2,370	1,280	595	80	14	6.0
13	72	63	192	242	254	1,000	2,020	1,280	581	80	14	6.0
14	64	58	175	210	250	950	1,700	1,410	525	80	14	6.0
15	54	51	157	210	250	900	1,700	1,340	560	67	14	6.0
16	51	51	145	160	250	760	1,340	1,160	525	64	13	6.0
17	51	51	145	120	320	760	1,220	1,050	525	64	12	6.0
18	51	51	145	120	345	760	1,100	1,100	525	58	10	6.0
19	51	51	145	192	595	760	950	950	473	51	9.2	6.0
20	50	51	145	182	2,560	760	950	900	460	49	9.2	6.0
21	49	51	135	175	11,500	760	900	850	460	39	9.2	6.0
22	45	51	132	172	13,500	718	1,000	850	400	39	9.2	6.0
23	46	51	169	169	3,450	675	1,280	805	345	39	9.2	6.0
24	39	51	760	160	6,870	675	1,480	850	305	39	6.0	6.0
25	39	51	553	145	8,920	675	1,780	760	286	39	6.0	6.0
26	39	89	320	145	4,750	675	2,020	760	250	34	6.0	10
27	39	192	246	160	2,760	675	1,940	718	250	34	6.0	12
28	39	130	372	145	1,940	805	1,780	760	218	34	6.0	12
29	39	107	305	172	.....	1,000	1,550	760	210	34	6.0	8.6
30	39	91	250	250	.....	1,340	1,410	760	210	29	6.0	7.6
31	39	.....	345	400	.....	1,160	.....	805	.....	29	6.0	.....

Monthly discharge of Cosumnes River at Michigan Bar, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	182	10	61.9	3,810
November	192	39	71.5	4,250
December	1,410	80	370	22,800
January	1,340	120	298	18,300
February	13,500	210	2,190	122,000
March	1,620	675	947	58,200
April	2,370	850	1,390	82,700
May	1,410	718	1,070	65,800
June	805	210	542	32,300
July	203	29	77.5	4,770
August	27	6.0	12.7	781
September	12	6.0	6.67	397
The year	13,500	6.0	574	416,000

GOOSE LAKE BASIN.

DREWS CREEK RESERVOIR NEAR LAKEVIEW, OREG.

LOCATION.—Dam is in sec. 5, T. 40 S., R. 18 E.; reservoir extends upstream about 10 miles.

RECORDS AVAILABLE.—February 26, 1913, to September 30, 1917, when station was discontinued; occasional readings until February 6, 1916; after that date, readings practically every day.

GAGE.—Gage face attached to plank on upstream face of dam since 1915. Previous readings obtained by measuring down from the floor of gate house. Gage heights refer to a datum level with lowest contour of reservoir. Gage readers, R. J. Gilbert and James McShane.

OUTLETS.—A tunnel with sill at elevation 16.3 feet and a blow-out pipe in center of dam at bottom.

EXTREMES OF STAGE.—Maximum stage recorded during year, 46.86 feet May 13 (quantity stored, 32,700 acre-feet); minimum stage recorded, 28.60 feet April 3 (quantity stored, 2,790 acre-feet).

1913–1917: Maximum stage recorded, 53.4 feet April 18–20, 1914 (quantity stored, 55,500 acre-feet).

ACCURACY.—Records good.

The following readings at the end of each month have been used in correcting the observed flow of Drews Creek below the dam:

Readings used in correcting observed flow of Drews Creek below dam for the year ending Sept. 30, 1917.

Date.	Gage height.	Storage.	Loss or gain during month.	Date.	Gage height.	Storage.	Loss or gain during month.
	Feet.	*Acre-feet.*	*Acre-feet.*		*Feet.*	*Acre-feet.*	*Acre-feet.*
Oct. 31	34.90	7,890	− 640	Apr. 30	46.17	30,690	+25,820
Nov. 30	35.00	8,010	+ 120	May 31	44.87	27,060	− 3,630
Dec. 31	35.21	8,280	+ 270	June 30	[a] 44.4	25,840	− 1,220
Jan. 31	35.37	8,490	+ 210	July 31	41.75	19,450	− 6,390
Feb. 28	35.56	8,740	+ 250	Aug. 31	40.20	16,200	− 3,250
Mar. 31	32.00	4,870	−3,870	Sept. 30	38.70	13,490	− 2,710

[a] Estimated.

DREWS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 40 S., R. 18 E., at highway bridge half a mile below mouth of Willow Creek, 1 mile below Drews Creek dam, and 18 miles southwest of Lakeview, Lake County.

DRAINAGE AREA.—211 square miles.

RECORDS AVAILABLE.—January 16, 1909, to September 30, 1917, when station was discontinued.

GAGE.—Friez water-stage recorder since March 19, 1912, referred to a vertical staff on the highway bridge, installed March 1, 1910. Gage inspected by R. J. Gilbert and James McShane. Inclined staff at station No. 1, at the dam site a mile above present gage, used January 16 to May 31, 1909, and vertical staff at station No. 2, at a dump-car bridge 100 feet below the dam site, November 20, 1909, to February 28, 1910.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; shifts slightly; drift and growth of aquatic plants may collect on control occasionally and affect stage-discharge relation. At highest stages water flows into a second channel.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.82 feet at 3 p. m. April 23 (discharge, 828 second-feet); minimum stage, from water-stage recorder, 1.77 feet at 8 a. m. December 5 (discharge uncertain; probably less than 1 second-foot).

1909–1917: Maximum stage recorded, 8.3 feet January 16, 1909, on original gage, (discharge, 2,730 second-feet). Gage height estimated as 12 to 13 feet on gage No. 2 (gage washed out) on evenings of March 1 and 2, 1910 (discharge probably about 3,000 second-feet. Creek dry at times prior to construction of reservoir.

ICE.—Stage-discharge relation affected by ice during the coldest weather—generally for one to two months.

DIVERSIONS.—The North Drews canal of the Goose Lake Valley Irrigation Co. diverts water past the station; record is kept of its discharge and this is added to determine the total run-off from the creek.

REGULATION.—Since the last part of 1912 water has been stored in the reservoir of the Goose Lake Valley Irrigation Co. just above the station. A negligible quantity of water was stored prior to that time. The run-off records when corrected for storage are often negative during the summer as the discharge into the reservoir becomes too small to offset the evaporation losses.

ACCURACY.—Stage-discharge relation fairly permanent and rating curve fairly well defined for period February 22 to July 8, which includes practically all the run-off; unstable rest of year on account of ice and growth of aquatic plants. Operation of water-stage recorder satisfactory for most of year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph, or for days of considerable fluctuation, by averaging results obtained by applying to the table the gage height for various subdivisions of the day. Discharge July 9 to September 30 computed by shifting-control method. Records good March to June; fair, July to September; roughly approximate, October to February.

Discharge measurements of Drews Creek near Lakeview, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 22	R. J. Gilbert [a]	[b] 2.45	1.0	Apr. 27	Henshaw and Heron	5.28	715
Mar. 7	Gilbert and Gillum [a]	2.18	16.4	July 5	Briggs and Heron	2.09	11.8
Apr. 2	Gilbert and Heron [a]	4.31	415	Aug. 21	K. A. Heron	2.00	5.5
26	do	5.35	692	Sept. 18	Briggs and Heron	2.00	3.8

[a] Employee of Goose Lake Valley Irrigation Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	20	438	685	14	.....	8	5
2	.....	.....	22	433	667	13	.....	9	.....
3	.....	.....	126	236	659	30	.....	9	.....
4	.....	.....	236	130	654	148	15	8	.....
5	.....	.....	119	160	659	61	12	10	.....
6	.....	.....	17	122	651	95	13	6	.....
7	.....	.....	17	89	654	124	16	6	.....
8	.....	.....	17	81	646	128	10	7	4
9	.....	.....	16	40	643	130	12	6	.....
10	30	.....	16	32	641	99	12	7	.....
11	20	.....	16	84	620	86	12	7	.....
12	.....	.....	16	40	638	86	14	8	.....
13	.....	.....	16	25	633	76	14	9	.....
14	.....	.....	16	22	633	101	14	10	.....
15	.....	.....	16	18	633	101	14	8	4
16	.....	.....	17	165	633	63	12	7	.....
17	.....	.....	16	248	636	12	11	9	.....
18	.....	.....	16	253	631	12	11	6	4
19	.....	.....	47	214	594	15	11	[a] 6	.....
20	.....	.....	144	339	615	18	11	[a] 5	.....
21	.....	.....	110	469	615	18	11	5	.....
22	.....	22	15	625	612	18	11	[a] 5	3
23	.....	22	15	729	612	18	11	[a] 5	.....
24	.....	22	15	745	609	.....	10	[a] 5	.....
25	.....	25	17	724	579	.....	9	5	.....
26	.....	22	17	698	396	.....	9	[a] 5	.....
27	.....	22	176	690	151	.....	8	[a] 5	.....
28	.....	21	332	685	17	.....	9	[a] 5	.....
29	.....	.....	466	685	16	.....	8	[a] 5	3
30	.....	.....	503	672	14	.....	9	[a] 5	.....
31	.....	.....	260	.....	14	.....	9	[a] 5	.....

[a] Interpolated.

NOTE.—Stage-discharge relation affected by ice at times during winter; flow small most of the time; daily discharge Jan. 10–11, estimated. Mean daily discharge estimated, as follows: Jan. 1–9 and Jan. 12 to Feb. 12, 1 second-foot; Feb. 13–21, 20 second-feet; June 24–30, 17 second-feet; July 1–3, 15 second-feet.

Monthly discharge of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October			[a] 1.0	61
November			[a] .5	30
December			[a] .5	31
January	30		[a] 2.5	154
February	25		12.4	689
March	503	15	92.0	5,660
April	745	18	330	19,600
May	685	14	531	32,600
June	148	12	52.8	3,140
July	16	8	11.7	719
August	10	5	6.6	406
September	5	3	3.8	226
The year	745		87.6	63,300

[a] Estimated.

NORTH DREWS CANAL NEAR LAKEVIEW, OREG.

LOCATION.—In sec. 3, T. 40 S., R. 18 E., nearly opposite station on Drews Creek, about 2 miles below intake of canal at Drews Creek dam, one-third mile above a spillway, 18 miles southwest of Lakeview, Lake County.

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1917, when station was discontinued.

GAGE.—Vertical staff on right side of flume at station 107. A gage just below outlet gate of dam was also read during 1915. Gage readers, R. J. Gilbert and James McShane.

DISCHARGE MEASUREMENTS.—Made from collar of flume or by wading.

CHANNEL AND CONTROL.—12-foot wooden flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and during period 1914 to 1917, 2.50 feet July 17–21 (discharge, 112 second-feet). Canal dry at times.

ACCURACY.—Stage-discharge relation not permanent owing to growth of aquatic plants. Rating curve used April 22 to July 31, fairly well defined. Daily discharge ascertained by applying daily gage height to rating table and interpolating records for days for which gage was not read. Shifting-control method used for October 1 to November 6, and August 1 to September 30; changes in stage-discharge relation somewhat uncertain; records only fair. Gage read to half-tenths daily July 8 to September 30, and about three times a week prior to June 9.

North Drews canal diverts water from drews Creek at reservoir dam in the SE. ¼ sec. 5 for irrigating land north of the creek on the west side of Goose Lake Valley.

Discharge measurements of North Drews canal near Lakeview, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 8	R. J. Gilbert [a]	0.63	10.0	Aug. 21	Gillum and Heron	1.44	31.8
29	do	1.42	37.2	Sept. 18	Briggs and Heron	1.76	28.7
July 5	Briggs and Heron [a]	2.06	[b]77				

[a] Employee of Goose Lake Valley Irrigation Co.
[b] Moss was beginning to grow in bottom of flume.

Daily discharge, in second-feet, of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	12	.....	a 12	a 39	.....	56	34
2	a 9	a 11	.....	a 12	39	.....	56	34
3	9	10	.....	a 12	39	.....	50	34
4	9	10	.....	a 12	a 39	.....	50	31
5	5	10	.....	12	25	77	50	34
6	a 5	5	.....	a 11	a 16	a 79	44	34
7	5	.....	.....	a 11	16	a 82	38	34
8	a 5	.....	.....	10	17	84	34	31
9	5	.....	.....	a 10	17	80	38	34
10	7	.....	.....	a 10	.....	88	38	34
11	a 7	.....	.....	12	.....	92	36	31
12	7	.....	.....	20	.....	92	36	31
13	a 8	.....	.....	a 19	.....	96	36	31
14	8	.....	.....	a 19	.....	96	36	29
15	a 8	.....	.....	18	.....	96	34	29
16	8	.....	.....	18	.....	96	31	31
17	a 8	.....	.....	a 18	.....	112	31	29
18	8	.....	.....	a 17	.....	112	31	29
19	9	.....	.....	17	.....	112	31	29
20	9	.....	.....	a 17	.....	112	31	29
21	9	.....	.....	a 17	.....	112	31	29
22	a 9	.....	5	a 17	.....	88	29	29
23	10	.....	14	a 17	.....	80	29	29
24	a 10	.....	a 20	a 17	.....	80	29	29
25	9	.....	20	17	.....	80	29	29
26	a 9	.....	a 20	14	.....	88	29	29
27	10	.....	a 20	a 14	.....	73	27	29
28	10	.....	20	14	.....	73	27	29
29	10	.....	12	37	.....	73	31	29
30	10	.....	a 12	a 37	.....	73	31	29
31	10	.....	.....	a 38	.....	66	36	.....

a Interpolated.

NOTE.—Canal dry Nov. 7 to Apr. 21; water in canal but no record June 10 to July 4; mean discharge estimated as 30 second-feet June 10–30 and 70 second-feet July 1–4.

Monthly discharge of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	10	5	8.2	504
November (6 days)	12	5	9.7	115
April (9 days)	20	5	15.9	284
May	38	10	17.0	1,050
June	.....	.....	29.2	1,740
July	112	.....	86.2	5,300
August	56	27	36.0	2,210
September	34	29	30.7	1,830
The year	.....	.....	.....	13,000

COTTONWOOD CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 38 S., R. 19 E., about half a mile below dam site of a proposed storage reservoir, near edge of valley, and 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—30 square miles.

RECORDS AVAILABLE.—November 22, 1908, to September 30, 1917, when station was discontinued.

GAGE.—Vertical staff on left bank; read once daily by Peter Segner. From November 22, 1908, to January 18, 1909, a gage just above a weir, one-fourth mile below the dam site, was used.

DISCHARGE MEASUREMENTS.—Made from a footbridge 40 feet below present gage, or by wading near gage.

CHANNEL AND CONTROL.—Bed composed of clean gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.0 feet May 10 (discharge, 265 second-feet); minimum stage recorded, 0.20 foot in October and November (discharge, 2 second-feet).

1908–1917: Maximum stage recorded, 3.4 feet November 23, 1909 (discharge, 337 second-feet); minimum discharge, 1 second-foot in 1909, 1910, 1913, and 1914.

ICE.—Stage-discharge relation seriously affected by ice from November to March; flow estimated.

DIVERSIONS.—At present practically no diversions above station.

ACCURACY.—Stage-discharge relation for stages below 0.7 foot changed during high water of April and May; affected by ice November 13 to March 28. Two well-defined rating curves used. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair for May and April on account of diurnal fluctuation; poor November to February owing to lack of measurements to determine effect of ice obstruction; good for rest of year.

Discharge measurements of Cottonwood Creek near Lakeview, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 23	A. Gillum [a]	[b] 0.35	4.5	July 6	Briggs and Heron	.60	21.9
Apr. 5	Gillum and Heron [a]	1.02	54	Aug. 22	K. A. Heron	.22	3.4
25	K. A. Heron	2.55	211				

[a] Employee of Goose Lake Valley Irrigation Co. [b] Ice in stream.

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	2.0	15	.....	87	97	112	32	8.8	6.5
2	3.5	2.0	9	.....	128	128	117	28	6.5	6.5
3	3.5	2.0	12	.....	139	102	107	25	6.5	6.5
4	3.5	3.5	9	.....	117	107	122	22	6.5	6.5
5	2.0	3.5	5.0	.....	47	107	128	22	8.8	6.5
6	2.0	3.5	3.5	.....	28	139	107	22	8.8	6.5
7	3.5	5.0	2.0	.....	35	150	172	19	8.8	6.5
8	5.0	5.0	2.0	.....	47	144	128	19	6.5	6.5
9	3.5	7	2.0	.....	64	241	139	16	6.5	4.6
10	3.5	9	2.0	.....	69	265	117	16	6.5	4.6
11	3.5	9	2.0	.....	87	253	134	16	6.5	4.6
12	2.0	5.0	2.0	.....	92	229	112	16	6.5	4.6
13	2.0	3.5	2.0	.....	87	178	97	16	6.5	2.7
14	2.0	3.5	2.0	.....	87	205	87	14	6.5	4.6
15	2.0	3.5	3.5	.....	69	161	92	14	8.8	4.6
16	2.0	3.5	5.0	.....	74	150	87	11	8.8	4.6
17	2.0	3.5	5.0	.....	47	139	97	11	8.8	4.6
18	2.0	5.0	5.0	.....	87	128	87	14	8.8	4.6
19	2.0	5.0	3.5	5	92	107	82	11	6.5	4.6
20	2.0	7	2.0	7	107	78	82	11	8.8	6.5
21	2.0	9	2.0	7	128	87	69	11	8.8	6.5
22	2.0	9	2.0	7	161	107	69	11	3.5	6.5
23	2.0	12	2.0	9	253	117	60	11	8.8	8.8
24	2.0	15	2.0	9	253	107	47	11	8.8	6.5
25	2.0	18	2.0	9	223	128	43	11	6.5	6.5
26	2.0	24	2.0	9	253	122	35	11	6.5	4.6
27	3.5	21	2.0	9	241	87	28	8.8	6.5	4.6
28	5.0	15	2.0	9	217	107	39	14	8.8	4.6
29	3.5	12	2.0	21	161	97	35	8.8	8.8	4.6
30	2.0	12	2.0	43	87	92	35	8.8	8.8	4.6
31	2.0	.....	2.0	69	.....	87	.....	8.8	8.8	.....

NOTE.—Stage-discharge relation affected by ice from about Nov. 13 to Mar. 27; discharge estimated from gage readings, observer's notes, temperature records, and one discharge measurement. Discharge Mar. 1–18 estimated as 3 second-feet.

Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	5.0	2.0	2.7	166
November	24	2.0	7.9	470
December	15	2.0	3.7	228
January	.....	.....	a 2.0	123
February	.....	.....	a 4.0	222
March	69	.....	8.6	529
April	253	28	119	7,080
May	265	78	137	8,420
June	172	28	88.9	5,290
July	32	8.8	15.2	935
August	8.8	3.5	7.6	467
September	8.8	2.7	5.5	327
The year	265	2.0	33.5	24,300

a Estimated.

THOMAS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In NE. ¼ sec. 22, T. 38 S., R. 19 E., at site of proposed diversion dam, near edge of valley, 8 miles below Thomas Creek reservoir, and 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to December 17, 1917, when station was discontinued.

GAGE.—Vertical staff driven in creek bed near left bank, 300 feet above highway bridge; read by George Wright. Gage readings beginning April 13, 1914, refer to a datum 0.46 foot lower than that previously used. Gage used January 1 to March 9, 1912, and also December 1, 1912, to February 29, 1913, was on right abutment of bridge over southernmost of three channels, into which creek divides at the road crossing.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Sand, gravel, and yellow clay; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year (from high-water marks observed April 25), 3.9 feet during night of April 24 (discharge, 310 second-feet); minimum stage recorded, 1.32 feet September 3 and 7 (discharge, 0.8 second-foot).

1912–1917: Maximum stage recorded, 4.15 feet April 15, 1914 (discharge, 440 second-feet); minimum stage recorded, 1.20 feet July 10, 12, and 16, 1916 (discharge, 0.5 second-foot).

ICE.—Stage-discharge relation not affected by ice owing to springs above the gage.

DIVERSIONS.—Two small irrigation ditches divert water around gage; one of these, Junto ditch, which had previously had a capacity of about 1 second-foot was enlarged early in 1917 and same fragmentary record of its discharge follows the records for the station on Thomas Creek.

ACCURACY.—Stage-discharge relation not permanent at low stages. Fairly well-defined rating curve used November 1, 1916, to July 10, 1917, and October 1 to December 17, 1917; indirect method for shifting control used October, 1916, and July 13 to September 30, 1917. Gage read to quarter-tenths once daily April 21 to June 9 and about twice a week during rest of period. Daily discharge ascertained by applying daily gage heights to rating table. Records good May to July; fair for rest of year.

Discharge measurements of Thomas Creek near Lakeview, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 28	F. F. Henshaw	2.70	107	Aug. 22	K. A. Heron	1.38	1.1
Jan. 24	A. Gillum[a]	1.50	3.8	Sept. 18	Briggs and Heron	1.38	1.3
July 6	Briggs and Heron[a]	1.36	1.5				

[a] Employee of Goose Lake Valley Irrigation Co.

Daily discharge, in second-feet, of Thomas Creek near Lakeview, Oreg., for the period Oct. 1 to Dec. 17, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							a6	60	71						
2			3.8	3.8			a6	63	83	3.4					
3		3.4			3.8	3.8	5.4	69	61			0.8	1.6		4.4
4	1.0						a8	107	66		1.7				
5			3.8				10	95	61	1.8					
6		1.6		3.8	3.8	3.8	a11	112	66	1.4			2.2		
7	1.9						12	128	66	1.6	2.2	.8		4.4	
8			3.8				a15	112	69						
9				3.8			18	123	71				2.8		
10	1.9	3.8			4.4	3.8	a18	114	a65	1.4					
11							18	158	a59		2.0	1.3			
12			3.8				a20	158	53						
13				3.8	4.4	3.8	a22	114	46	3.2	2.0		2.8		
14	1.2						24	120	42	1.3					
15							a21	114	40			1.4			
16		2.8	3.8	3.8			18	77	40	1.7			2.2		
17	3.1				3.8	3.8	a12	71	a39			1.4			4.4
18							7	66	38		1.8	1.3			
19			3.8				a13	51	33	2.0				3.8	
20		3.4		3.8	3.8	3.8	a20	56	a30				1.4		
21	3.1						27	51	a28	1.6	1.3				
22			3.8				33	51	25		1.1	1.5			
23	3.0			3.8			83	56	18				1.1		
24		3.4		3.8	3.8	4.4	188	56	18	1.2					
25							142	51	17		.8	1.5			
26			3.8				150	56	a14					3.8	
27				3.8	3.8	5.4	135	56	12				1.8		
28		3.8					107	61	a12	2.4					
29	3.5					7	53	95	12		1.2	1.4			
30			3.8				56	83	11	2.2			1.8		
31				3.8		7		83							

[a] Interpolated.

Monthly discharge of Thomas Creek near Lakeview, Oreg., for the period Oct. 1, 1916, to Dec. 31, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1916–17.				
October	3.5	1.0	2.3	141
November	3.8	1.6	3.2	190
December	3.8	3.8	3.8	234
January	3.8	3.8	3.8	234
February	4.4	3.8	4.0	222
March	7	3.8	4.7	289
April	188	5.4	41.9	2,490
May	158	51	86.0	5,290
June	83	11	42.2	2,510
July	3.4	1.2	1.9	117
August	2.2	.8	1.6	98
September	1.5	.8	1.3	77
The year	188	.8	16.4	11,900
1917.				
October	2.8	1.1	2.0	123
November			4.0	238
December			4.4	271
The period				632

Discharge measurements of Junto ditch near Lakeview, Oreg., during the year ending Sept. 30, 1917.

[Made by K. A. Heron.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 1	1.72	6.7
Aug. 22		1.0
Sept. 18	1.22	1.1

Daily discharge, in second-feet, of Junto ditch near Lakeview, Oreg., for 1917.

	Sec.-feet.		Sec.-feet.
June 1	6.7	Oct. 23	0.9
July 6	6.7	27	1.1
Aug. 22	1.0	30	1.0
Sept. 18	1.1		

NOTE.—Water began running May 20 and was increased gradually. Water turned out July 13 and about 2 second-feet turned in July 14. Water turned out about Nov. 1. Total run-off May 26 to Oct. 31 estimated as 800 acre-feet.

SACRAMENTO RIVER BASIN.

MAIN STREAM.

SACRAMENTO RIVER AT CASTELLA, CALIF.

LOCATION.—In sec. 22, T. 38 N., R. 4 W., at private highway bridge at Castella, Shasta County, half a mile below mouth of Castle Creek.

DRAINAGE AREA.—257 square miles.

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1917.

GAGE.—Vertical staff on downstream end of bridge pier near right bank; read by H. O. Wickes.

DISCHARGE MEASUREMENTS.—Made from bridge at Sweetbrier camp, half a mile below gage.

CHANNEL AND CONTROL.—Rough; small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 5 p. m. February 24 and 7.30 a. m. February 25 (discharge, from extension of rating curve, about 6,660 second-feet); minimum stage recorded, 2.05 feet September 19–30 (discharge, 108 second-feet).

1910–1917: Maximum stage recorded, 13.7 feet at 5.50 a. m. January 2, 1914 (discharge, from extension of rating curve, about 16,000 second-feet); minimum stage recorded September 19–30, 1917.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 3,500 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily-gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by H. O. Wickes.

Discharge measurements of Sacramento River at Castella, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	J. F. Kunesh	2.37	225	May 25	J. F. Kunesh	3.48	781
Nov. 1	do	2.37	222	July 12	McGlashan and Kunesh	2.28	194
Mar. 13	do	2.80	450	14	do	2.28	192
Apr. 22	do	3.68	951	Sept. 14	J. F. Kunesh	2.21	164

Daily discharge, in second-feet, of Sacramento River at Castella, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	223	212	238	230	270	650	590	880	800	230	160	125
2	223	212	970	230	270	562	620	720	720	230	160	125
3	223	212	650	230	270	535	590	800	685	230	160	125
4	223	462	535	230	270	462	620	880	650	230	160	125
5	223	270	535	230	270	440	720	880	590	230	160	125
6	223	350	485	230	290	440	760	970	590	220	160	125
7	223	270	418	230	290	440	800	1,060	590	220	160	125
8	223	262	310	230	310	418	1,210	1,060	562	212	160	125
9	223	250	310	230	330	418	800	1,260	535	206	160	125
10	223	238	270	230	330	395	720	970	535	206	142	125
11	223	230	270	230	330	395	1,680	1,260	485	195	142	125
12	223	230	270	230	330	395	1,570	1,260	462	195	142	125
13	223	230	262	230	350	395	1,910	2,270	440	195	142	125
14	223	230	262	230	350	372	1,680	1,260	440	195	142	125
15	212	220	262	230	350	372	760	1,060	418	160	142	125
16	212	220	250	230	350	350	650	840	418	160	142	125
17	212	220	238	230	350	350	590	840	395	170	142	125
18	212	220	238	230	350	350	562	800	395	170	142	125
19	212	220	250	230	350	350	535	720	372	178	142	108
20	212	212	262	230	330	372	562	720	350	178	125	108
21	212	212	262	230	330	418	590	720	330	178	125	108
22	212	212	270	230	418	395	880	760	330	178	125	108
23	212	212	270	230	440	372	1,060	760	310	170	125	108
24	212	212	270	230	4,440	395	1,260	760	310	170	125	108
25	212	212	238	230	6,660	418	1,460	760	310	170	125	108
26	212	330	238	230	1,790	418	1,460	720	290	170	125	108
27	212	270	238	230	1,160	462	1,360	720	290	170	125	108
28	212	270	238	330	800	620	1,160	720	270	160	125	108
29	212	250	230	310	.....	840	970	925	270	160	125	108
30	212	238	230	330	.....	800	880	840	262	160	125	108
31	212	.....	230	290	.....	620	.....	840	.....	160	125	.....

Monthly discharge of Sacramento River at Castella, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 257 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	223	212	217	0.844	0.97	13,300
November	462	212	246	.957	1.07	14,600
December	970	230	323	1.26	1.45	19,900
January	330	230	241	.938	1.08	14,800
February	6,660	270	799	3.11	3.24	44,400
March	840	350	459	1.79	2.06	28,200
April	1,910	535	967	3.76	4.20	57,500
May	2,270	720	937	3.65	4.21	57,600
June	800	262	447	1.74	1.94	26,600
July	230	160	189	.735	.85	11,600
August	160	125	141	.549	.63	8,670
September	125	108	118	.459	.51	7,020
The year	6,660	108	420	1.63	22.21	304,060

SACRAMENTO RIVER NEAR RED BLUFF, CALIF.

LOCATION.—In lot 4, sec. 34, T. 28 N., R. 3 W., at lower end of Iron Canyon, 3 miles below proposed Iron Canyon dam site and 4 miles northeast of Red Bluff, Tehama County. Paines Creek enters about 3 miles above and Antelope Creek 7 miles below station.

DRAINAGE AREA.—9,300 square miles, not including the drainage area of Goose Lake—1,090 square miles—which belongs naturally in Pit River basin but has contributed no water except for a short time in 1869 and for more than two hours during a severe storm from the north in 1881, when the lake overflowed to North Fork of Pit River. Previously published figures of discharge in second-feet per square mile and run-off in depth in inches, based on the drainage area including Goose Lake, should be used with caution because of the large noncontributing area.

RECORDS AVAILABLE.—January 28, 1902, to September 30, 1917. In 1879 the State engineer and in 1893 and 1894 the commissioner of public works made measurements at this point. From April 30, 1895, to June 30, 1902, a gaging station was maintained at Jellys Ferry, 12 miles above Red Bluff.

GAGE.—Staff in seven sections on left bank; read by Richard Groebe. Several gages have been used at this station, but all observations have been reduced to the present datum. The United States Weather Bureau gage at Red Bluff has been used occasionally.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above the gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 28.0 feet at 4.20 p. m. February 11 (discharge, 188,000 second-feet); minimum stage recorded, 1.0 foot August 14–16 and September 6–9, 19–20 (discharge, 4,200 second-feet).

1902–1917: Maximum stage recorded, 35.2 feet, February 3, 1909 (discharge, 278,000 second-feet); minimum stage recorded, 0.9 foot September 7–28, 1903 (discharge, 3,980 second-feet).

DIVERSIONS.—A small amount of water is diverted from some of the minor tributaries for irrigation.

REGULATION.—No large storage reservoirs have been developed in the drainage area above the station.

ACCURACY.—Stage-discharge relation permanent except for slight variation at low water, the maximum amount of which is 5 per cent at the minimum recorded stage of 0.9 foot. Such a change probably occurred February 25. Rating curves well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of Sacramento River near Red Bluff, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 9	2.21	7,220
July 15	1.35	4,980
Sept. 7	1.05	4,300

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,000	5,210	5,650	6,630	7,710	22,300	17,400	17,800	10,200	5,590	4,650	4,200
2	5,210	5,210	8,910	9,860	7,160	19,000	17,400	16,600	9,540	5,590	4,650	4,200
3	5,210	5,210	18,600	10,900	6,890	16,600	18,200	15,900	9,540	5,350	4,650	4,200
4	5,210	5,210	27,200	8,300	6,630	15,100	18,200	15,100	9,220	5,350	4,650	4,200
5	5,210	6,370	13,300	17,800	6,630	13,700	18,200	14,800	8,910	5,350	4,650	4,200
6	5,210	6,370	14,400	14,000	6,630	13,300	17,400	14,400	8,600	5,350	4,650	4,200
7	5,430	6,120	9,540	9,540	6,630	12,900	19,000	14,000	8,600	5,110	4,650	4,200
8	5,650	5,650	8,300	8,300	6,890	12,200	20,200	14,000	8,300	5,110	4,650	4,200
9	5,430	5,650	7,160	7,710	6,630	13,300	23,600	14,000	8,300	5,110	4,420	4,200
10	5,210	5,650	6,890	7,160	6,630	12,900	23,200	14,000	8,300	5,110	4,420	4,200
11	5,210	5,430	6,630	6,890	6,630	11,500	30,300	14,400	8,300	5,110	4,200	4,420
12	5,210	5,430	6,630	6,890	6,630	10,900	33,200	14,400	8,000	5,110	4,200	4,650
13	5,210	5,430	6,370	6,630	6,630	10,900	28,000	14,400	7,710	4,880	4,200	4,420
14	5,210	5,210	6,630	6,630	6,630	11,200	28,000	14,000	7,430	4,880	4,200	4,420
15	5,210	5,210	6,120	6,370	6,630	10,500	24,000	13,700	7,150	4,880	4,200	4,420
16	5,210	5,210	6,120	6,120	6,630	10,200	21,900	12,900	7,150	4,880	4,200	4,200
17	5,210	5,210	6,120	5,880	6,630	9,860	19,800	12,200	7,150	4,880	4,420	4,200
18	5,210	5,210	6,120	5,880	6,630	9,860	17,800	12,900	6,880	4,880	4,420	4,200
19	5,210	5,210	6,120	6,120	6,630	9,860	16,200	12,600	6,880	4,880	4,420	4,200
20	5,210	5,210	6,120	5,880	7,160	9,540	15,500	12,200	6,610	4,880	4,200	4,200
21	5,210	5,210	6,120	5,880	8,600	9,540	15,100	11,500	6,350	4,650	4,200	4,200
22	5,210	5,210	5,880	5,880	16,200	9,540	17,400	11,500	6,090	4,650	4,200	4,420
23	5,210	5,210	6,370	5,880	15,100	9,540	26,200	11,200	6,090	4,650	4,200	4,650
24	5,210	5,210	8,600	5,880	55,000	9,540	28,000	10,900	6,090	4,650	4,200	4,650
25	5,210	5,210	9,220	5,650	176,000	9,540	28,000	12,900	5,840	4,650	4,420	4,650
26	5,210	8,000	6,630	5,880	92,800	9,540	24,000	11,500	5,840	4,650	4,420	4,420
27	5,210	7,160	6,630	5,880	38,500	10,200	26,700	10,200	5,840	4,650	4,420	4,420
28	5,210	6,370	6,630	6,120	28,500	11,900	23,600	10,500	5,590	4,650	4,420	4,420
29	5,210	6,120	6,630	11,900	.....	12,900	21,900	10,500	5,590	4,650	4,420	4,420
30	5,210	5,880	6,630	9,860	.....	18,200	19,000	10,500	5,590	4,650	4,420	4,420
31	5,210	.....	6,630	8,910	.....	17,800	.....	10,200	.....	4,650	4,420	.....

NOTE.—No record Nov. 19 to Dec. 8; discharge estimated from U. S. Weather Bureau gage heights at Red Bluff.

Monthly discharge of Sacramento River near Red Bluff, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 9,300 square miles.]

Month.	Discharge in second-feet.				Run-off	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	5,650	5,000	5,230	0.562	0.65	322,000
November	8,000	5,210	5,630	.605	.67	335,000
December	27,200	5,650	8,350	.898	1.04	513,000
January	17,800	5,650	7,780	.837	.96	478,000
February	176,000	6,630	20,200	2.17	2.26	1,120,000
March	22,300	9,540	12,400	1.33	1.53	762,000
April	33,200	15,100	21,900	2.35	2.62	1,300,000
May	17,800	10,200	13,100	1.41	1.63	805,000
June	10,200	5,590	7,390	.795	.89	440,000
July	5,590	4,650	4,950	.532	.61	304,000
August	4,650	4,200	4,400	.473	.55	271,000
September	4,650	4,260	4,330	.466	.52	258,000
The year	176,000	4,200	9,550	1.03	13.93	6,910,000

PIT RIVER AND TRIBUTARIES.

PIT RIVER AT HENDERSON, CALIF.

LOCATION.—In sec. 36, T. 37 N., R. 1 W., at Big Bend ferry, one-fourth mile above Henderson, Shasta County. Nelson Creek enters half a mile above and Kosk Creek 1 mile below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1910, to September 30, 1917.

GAGE.—Gurley seven-day water-stage recorder 50 feet below vertical staff fastened to an alder tree on left bank about 100 feet above ferry. Original datum has been maintained. The gages do not read exactly the same on account of the slope of the water surface. Staff gage is the original gage. From December 28, 1912, to September 21, 1917, record is from a Gurley printing water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet below water-stage recorder.

CHANNEL AND CONTROL.—Boulders and coarse gravel; rough; fairly permanent. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.39 feet at 8 p. m. April 25 (discharge, 13,600 second-feet); minimum stage from water-stage recorder, 0.6 foot at 5 a. m. August 14 (discharge, 2,490 second-feet).

1910–1917: Maximum stage recorded, 5.39 feet April 25, 1917 (discharge, 13,600 second-feet); minimum stage recorded, 0.6 foot September 23–25, 1913, and August 14, 1917 (discharge, 2,490 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No information.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Mean daily gage height determined by averaging readings printed every 15 minutes by the Gurley printing gage and by inspecting the graph made by the Gurley graph water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Pit River at Henderson, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 3	Charles Leidl	1.02	3,050	Sept. 22	J. F. Kunesh	.68	2,500
4	do	1.05	3,110	23	do	.69	2,590

Daily discharge, in second-feet, of Pit River at Henderson, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,690	2,940	2,940	2,780	2,780	4,870	9,610	7,360	4,150	3,020	2,700	2,630
2	2,690	2,940	3,110	2,780	2,780	4,560	9,350	7,120	3,850	2,940	2,700	2,630
3	2,690	2,940	3,200	2,860	2,780	4,450	9,870	6,880	3,950	2,940	2,700	2,630
4	2,770	2,940	3,200	2,780	2,780	4,350	10,100	6,400	3,850	2,940	2,700	2,630
5	2,770	3,020	3,200	2,780	2,780	4,250	9,610	6,170	3,760	2,940	2,700	2,630
6	2,770	3,020	3,110	2,780	2,780	4,250	9,870	6,060	3,660	2,940	2,700	2,630
7	2,770	2,940	3,020	2,780	2,780	4,250	10,600	5,940	3,560	2,940	2,700	2,630
8	2,770	2,940	2,940	2,780	2,780	4,150	11,200	5,830	3,560	2,940	2,700	2,630
9	2,770	2,940	2,940	2,780	2,780	4,050	12,200	5,720	3,660	2,940	2,700	2,630
10	2,770	2,860	2,860	2,780	2,780	3,950	12,500	5,720	3,660	2,860	2,560	2,630
11	2,770	2,940	2,860	2,780	2,780	3,760	11,700	5,720	3,760	2,780	2,560	2,700
12	2,850	2,860	2,860	2,780	2,780	3,660	12,000	5,720	3,660	2,780	2,560	2,700
13	2,850	2,860	2,860	2,700	2,860	3,560	12,800	5,720	3,560	2,700	2,560	2,700
14	2,850	2,860	2,860	2,700	2,860	3,470	12,200	5,720	3,560	2,860	2,490	2,700
15	2,850	2,860	2,780	2,700	2,860	3,470	11,200	5,610	3,470	2,860	2,630	2,700
16	2,850	2,860	2,780	2,700	2,940	3,380	9,870	5,500	3,380	2,780	2,630	2,700
17	2,940	2,860	2,780	2,700	2,940	3,470	8,850	5,500	3,470	2,780	2,700	2,700
18	2,940	2,940	2,780	2,700	2,940	3,560	7,850	5,610	3,470	2,780	2,700	2,700
19	2,940	2,860	2,780	2,700	2,940	3,650	7,360	5,610	3,470	2,780	2,630	2,630
20	2,940	2,860	2,860	2,700	2,860	3,560	7,120	5,500	3,290	2,780	2,630	2,630
21	2,860	2,860	2,860	2,700	3,110	3,660	7,120	5,400	3,110	2,700	2,630	2,630
22	2,940	2,860	2,860	2,700	3,660	3,660	8,350	5,290	3,110	2,700	2,630	2,630
23	2,940	2,860	2,860	2,700	3,660	3,660	10,900	5,080	3,110	2,700	2,630	2,630
24	2,860	2,860	2,940	2,700	5,610	3,660	12,500	4,980	3,020	2,700	2,630	2,630
25	2,860	2,940	2,860	2,700	9,610	3,950	13,300	4,870	3,020	2,700	2,630	2,630
26	2,940	3,020	2,860	2,700	6,880	4,250	13,100	4,660	3,110	2,700	2,700	2,630
27	2,940	3,020	2,860	2,700	5,610	4,660	11,400	4,560	3,110	2,700	2,700	2,630
28	2,940	2,940	2,860	2,780	5,180	5,500	9,870	4,450	3,110	2,700	2,700	2,630
29	2,860	2,940	2,780	2,860	.....	7,120	8,850	4,450	3,110	2,630	2,700	2,630
30	2,860	2,940	2,780	2,860	.....	8,350	8,100	4,350	3,020	2,630	2,700	2,630
31	2,860	.....	2,780	2,860	.....	8,850	.....	4,250	.....	2,700	2,700	.....

Monthly discharge of Pit River at Henderson, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,940	2,690	2,840	175,000
November	3,020	2,860	2,920	174,000
December	3,200	2,780	2,900	178,000
January	2,860	2,700	2,750	169,000
February	9,610	2,780	3,570	198,000
March	8,850	3,380	4,380	269,000
April	12,300	7,120	10,300	613,000
May	7,360	4,250	5,540	341,000
June	4,150	3,020	3,450	205,000
July	3,020	2,630	2,800	172,000
August	2,700	2,490	2,650	163,000
September	2,700	2,630	2,650	158,000
The year	12,300	2,490	3,990	2,820,000

PIT RIVER NEAR YDALPOM, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 34 N., R. 3 W., at Silverthorne Ferry, 1½ miles southwest of Ydalpom, Shasta County, and 7½ miles above junction with Sacramento River. Squaw Creek enters half a mile above and McCloud River 4 miles below station.

DRAINAGE AREA.—5,260 square miles, not including Goose Lake. (See information under "drainage area" for Sacramento River near Red Bluff, p. 199.)

RECORDS AVAILABLE.—November 16, 1910, September 30, 1917.

GAGE.—Vertical staff in two sections fastened to an ash tree on left bank 350 feet below ferry. Read by M. D. Rodrigue.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet above ferry cable.

CHANNEL AND CONTROL.—Gravel and sand; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.5 feet at 4 p. m. February 24 and at 8 a. m. February 25 (discharge, from extension of rating curve, about 40,700 second-feet); minimum stage recorded, 2.7 feet August 20–25 (discharge, 2,630 second-feet).

1910–1917: Maximum stage recorded, 18.2 feet, December 31, 1913 (discharge, from extension of rating curve, about 47,000 second-feet); minimum stage recorded, August 20–25, 1917.

DIVERSIONS.—A small amount of water is diverted from the main stream and tributaries, above the station, for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 35,000 second-feet and extended above. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Pit River near Ydalpom, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 7	Charles Leidl	3.54	3,920
Mar. 12	J. F. Kunesh	4.21	5,020
Sept. 12	do	2.78	2,750

U. S. Geol. Survey
Library Copy
SAN FRANCISCO, CALIF.

Daily discharge, in second-feet, of Pit River near Ydalpom, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,780	3,080	3,080	3,230	3,700	8,120	10,500	9,390	4,500	3,230	2,780	2,780
2	2,780	3,080	4,340	3,230	3,540	7,120	11,200	8,750	4,500	3,230	2,780	2,780
3	2,780	3,080	6,550	3,230	3,380	6,360	11,700	8,330	4,340	3,230	2,780	2,780
4	2,780	3,080	5,820	3,080	3,380	6,360	11,900	8,120	4,240	3,080	2,790	2,780
5	2,780	3,380	4,660	3,080	3,380	6,180	11,700	7,520	4,340	3,080	2,780	2,780
6	2,930	3,700	4,180	3,080	3,380	5,820	12,400	7,520	4,340	3,080	2,780	2,780
7	2,930	3,700	3,860	3,080	3,380	5,650	12,900	7,120	4,240	3,080	2,780	2,790
8	3,080	3,540	3,700	3,080	3,380	5,310	14,700	6,980	4,340	3,080	2,780	2,780
9	3,050	3,380	3,700	3,080	3,380	5,310	15,500	6,360	4,180	3,080	2,780	2,780
10	3,080	3,230	3,540	3,080	3,380	5,310	16,400	6,360	4,180	3,080	2,780	2,780
11	2,930	3,080	3,540	3,080	3,380	5,140	15,500	6,360	4,020	2,930	2,780	2,780
12	2,930	3,080	3,380	3,080	3,380	4,980	17,500	6,360	4,020	2,930	2,780	2,780
13	2,930	3,080	3,380	3,080	3,380	4,980	17,800	6,930	4,020	2,930	2,780	2,780
14	2,930	3,080	3,380	3,080	3,380	4,980	16,400	6,980	3,860	2,930	2,780	2,780
15	2,930	2,930	3,380	3,080	3,380	5,140	15,000	6,740	3,860	2,780	2,780	2,780
16	2,930	2,930	3,380	3,080	3,380	5,140	13,200	6,740	3,860	2,780	2,780	2,930
17	2,930	2,930	3,380	3,080	3,380	5,310	11,900	6,550	3,700	2,780	2,780	2,930
18	2,930	2,930	3,380	3,080	3,380	5,480	10,800	6,550	3,700	2,780	2,780	2,930
19	2,930	2,930	3,380	3,080	4,340	5,650	9,170	6,550	3,700	2,780	2,780	2,930
20	2,930	2,930	3,380	3,080	4,980	5,650	8,750	6,360	3,540	2,780	2,630	2 930
21	2,930	2,930	3,380	3,080	8,750	5,820	8,330	6,180	3,540	2,780	2,630	2,930
22	2,930	2,930	3,380	3,080	6,000	6,000	9,610	6,000	3,540	2,750	2,630	2,930
23	2,930	2,930	3,380	3,080	5,140	6,000	12,400	5,820	3,540	2,780	2,630	2,780
24	2,930	2,930	3,230	3,080	30,700	6,180	16,600	5,650	3,380	2,780	2,630	2,780
25	2,930	2,930	3,230	3,080	35,600	6,180	18,700	5,480	3,380	2,780	2,630	2,780
26	2,930	2,930	3,230	3,080	25,900	6,360	17,500	5,310	3,380	2,780	2,780	2,780
27	2,930	2,930	3,230	3,080	13,200	6,360	14,200	5.140	3,380	2,780	2,780	2,780
28	2,930	2,930	3,230	4,020	9,610	6,550	13,200	4,980	3,380	2,790	2,780	2,780
29	2,930	2,930	3,230	4,660	.....	8,330	11,900	4,820	3,380	2.780	2,780	2,780
30	2,930	2,930	3,230	4,340	.....	9,610	10,500	4,660	3,380	2,780	2,780	2,780
31	2,930	.....	3,230	3,860	.....	10,100	.....	4,660	.....	2,780	2,780	.....

Monthly discharge of Pit River near Ydalpom, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 5,260 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	3,080	2,780	2,920	0.555	0.64	180,000
November	3,700	2,930	3,090	.586	.65	183,000
December	6,550	3,080	3,660	.696	.80	225,000
January	4,660	3,080	3,240	.616	.71	199,000
February	35,600	3,380	7,340	1.40	1.46	408,000
March	10,100	4,980	6,180	1.17	1.35	380,000
April	18,700	8,330	13,300	2.53	2.82	791,000
May	9,390	4,660	6,490	1.23	1.42	399,000
June	4,500	3,380	3,870	.736	.82	230,000
July	3,230	2,780	2,910	.553	.64	179,000
August	2,780	2,630	2,750	.523	.60	169,000
September	2,930	2.780	2,820	.536	.60	168,000
The year	35,600	2,630	4,850	.922	12.51	3,510,000

HAT CREEK AT HAT CREEK, CALIF.

LOCATION.—In SE. ¼ sec. 10, T. 34 N., R. 4 E., at private highway bridge on Morris ranch, in Lassen National Forest, 1 mile north of Hat Creek post office, Shasta County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 22, 1910, to July 2, 1917, when station was discontinued.

GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read by Fred Heaborn. Original gage, which was at the same location, was carried out by mud flow from Lassen volcano in May, 1915; original datum lost.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Rough; gravel and small bowlders. Control shifts slightly.

EXTREMES OF STAGE.—1910–1917: Maximum stage recorded, 2.95 feet (original datum) at 3.55 p. m., May 17, 1915; minimum stage recorded, 1.73 feet, September 11, 1913 (discharge, 24 second-feet).

ICE.—No information.

DIVERSIONS.—On account of diversions for irrigation above station, this record does not show natural run-off from drainage basin. On May 13, 1911, the nine ditches were diverting 110 second-feet. Of this amount, it is estimated that 55 second-feet was returned to stream above gage.

REGULATION.—No information.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Data inadequate for determination of discharge.

No discharge measurements were made during the year.

Daily gage height, in feet, of Hat Creek at Hat Creek, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.
1						2.05		
2	1.73							1.10
3								
4					1.80	1.90		
5			1.86			1.95	1.50	
6		1.75						
7								
8					2.00			
9			1.79				1.90	
10	1.73					1.50		
11					2.23			
12					1.86			
13		1.70						
14								
15						1.78		
16			1.70		1.68			
17				1.79				
18							1.33	
19								
20	1.74	1.79						
21					1.80			
22				1.80				
23			1.84		2.00			
24					1.95	1.82	1.40	
25								
26				1.79				
27	1.75							
28				1.90				
29	1.77							
30						1.50		
31								

McCLOUD RIVER AT BAIRD, CALIF.

LOCATION.—In NW. ¼ sec. 23, T. 34 N., R. 4 W., at United States fishery at Baird, Shasta County, about 2 miles above junction with Pit River. Bailey Creek enters about 2,000 feet above and Johns Creek 2,000 feet below station.

DRAINAGE AREA.—665 square miles.

RECORDS AVAILABLE.—December 22, 1910, to September 30, 1917.

GAGE.—Vertical staff fastened to alder tree on right bank, 600 feet above the hatchery; read by employees of United States fishery.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Gravel and cobblestones; fairly permanent.

EXTREMES OF DISCHARGE.—1910–1917: maximum stage recorded, 14.3 feet at noon February 25, 1917 (discharge, 27,600 second-feet); minimum stage recorded, 1.52 feet August 16–23, 1917 (discharge, 1,040 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 25. Rating curves used before and after the change well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by W. K. Hancock superintendent, of the United States fishery.

Discharge measurements of McCloud River at Baird, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 7	Charles Leidl	2.58	1,840	May 25	Charles Leidl	2.60	1,800
Apr. 21	do	3.03	2,220	July 11	McGlashan and Kunesh	1.83	1,210
21	do	3.03	2,220	Sept. 11	J. F. Kunesh	1.69	1,150

Daily discharge, in second-feet, of McCloud River at Baird, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,420	1,360	1,480	1,420	1,620	3,490	2,000	2,390	1,820	1,340	1,140	1,090
2	1,420	1,360	2,110	1,420	1,550	3,030	2,000	2,390	1,820	1,340	1,140	1,090
3	1,420	1,360	2,590	1,420	1,550	2,700	2,000	2,390	1,820	1,270	1,140	1,090
4	1,420	1,480	2,590	1,420	1,480	2,490	2,000	2,290	1,820	1,270	1,140	1,090
5	1,420	1,480	3,030	1,550	1,480	2,390	2,000	2,290	1,730	1,270	1,140	1,090
6	1,420	1,620	2,200	1,550	1,480	2,190	2,090	2,190	1,650	1,270	1,140	1,090
7	1,420	1,480	1,930	1,550	1,480	2,190	2,190	2,190	1,650	1,270	1,140	1,090
8	1,420	1,420	1,690	1,480	1,480	2,000	2,490	2,190	1,650	1,270	1,140	1,090
9	1,420	1,420	1,620	1,420	1,480	2,000	2,390	2,190	1,650	1,270	1,140	1,090
10	1,420	1,420	1,550	1,420	1,480	2,000	2,190	2,190	1,650	1,270	1,090	1,090
11	1,420	1,360	1,550	1,420	1,480	1,910	2,590	2,190	1,650	1,200	1,090	1,140
12	1,420	1,360	1,480	1,420	1,480	1,820	3,990	2,290	1,570	1,200	1,090	1,090
13	1,420	1,360	1,480	1,420	1,480	1,910	3,250	2,290	1,490	1,200	1,090	1,090
14	1,420	1,360	1,420	1,420	1,480	1,820	3,030	2,190	1,490	1,200	1,040	1,090
15	1,420	1,360	1,420	1,420	1,480	1,820	2,700	2,190	1,490	1,200	1,040	1,090
16	1,420	1,360	1,420	1,420	1,480	1,730	2,590	2,090	1,490	1,200	1,040	1,090
17	1,360	1,360	1,420	1,420	1,480	1,730	2,390	2,090	1,490	1,200	1,040	1,090
18	1,360	1,360	1,420	1,420	1,480	1,730	2,190	2,090	1,490	1,200	1,040	1,090
19	1,360	1,360	1,420	1,420	1,550	1,730	2,190	2,000	1,490	1,200	1,040	1,090
20	1,360	1,360	1,420	1,360	1,550	1,730	2,190	2,000	1,490	1,200	1,040	1,090
21	1,360	1,360	1,420	1,360	1,550	1,730	2,190	1,910	1,410	1,200	1,040	1,090
22	1,360	1,360	1,420	1,360	2,020	1,730	2,590	1,910	1,410	1,200	1,040	1,090
23	1,360	1,360	1,620	1,360	2,200	1,730	3,030	1,820	1,340	1,200	1,040	1,090
24	1,360	1,360	1,550	1,360	9,660	1,730	3,250	1,820	1,340	1,200	1,040	1,090
25	1,360	1,360	1,420	1,360	27,600	1,730	3,140	1,820	1,340	1,200	1,090	1,090
26	1,360	1,420	1,420	1,360	10,600	1,730	3,030	1,820	1,340	1,200	1,140	1,090
27	1,360	1,420	1,420	1,360	6,060	1,730	3,030	1,820	1,340	1,200	1,140	1,090
28	1,360	1,420	1,420	1,420	3,610	1,820	2,810	1,820	1,340	1,200	1,140	1,090
29	1,360	1,420	1,420	2,020	.....	2,000	2,700	1,820	1,340	1,140	1,090	1,090
30	1,360	1,420	1,420	1,850	.....	2,390	2,590	1,820	1,340	1,140	1,090	1,090
31	1,360	.....	1,420	1,690	.....	2,190	.....	1,820	.....	1,140	1,090	.....

Monthly discharge of McCloud River at Baird, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1,420	1,360	1,390	2.09	2.41	85,500
November	1,620	1,360	1,400	2.11	2.35	83,300
December	3,030	1,420	1,650	2.48	2.86	101,000
January	2,020	1,360	1,460	2.20	2.54	89,800
February	27,600	1,480	3,330	5.01	5.22	185,000
March	3,490	1,730	2,030	3.05	3.52	125,000
April	3,990	2,000	2,560	3.85	4.30	152,000
May	2,390	1,820	2,070	3.11	3.59	127,000
June	1,820	1,340	1,530	2.30	2.57	91,000
July	1,340	1,140	1,220	1.83	2.11	75,000
August	1,140	1,040	1,090	1.64	1.89	67,000
September	1,140	1,090	1,090	1.64	1.83	64,900
The year	27,600	1,040	1,720	2.59	35.19	1,250,000

LITTLE STONY CREEK BASIN.

LITTLE STONY CREEK NEAR LODOGA, CALIF.

LOCATION.—At East Park reservoir, 4 miles above junction with Stony Creek and 3½ miles northwest of Lodoga, Colusa County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—January 1, 1908, to September 30, 1917; only discharge measurements in 1907.

GAGE.—Beginning December 1, 1910, the record is from the gage at the dam. Previous to this date the station was maintained a short distance below the present site. Gage read by J. J. Lea.

DISCHARGE.—Computed from gage heights observed at the dam. Correction has been made for evaporation, which is determined from records obtained from an evaporation pan at reservoir. When the flow is 10 second-feet or less the discharge is computed from weir and current-meter measurements taken at the head of the reservoir about 3 miles above the dam.

EXTREMES OF DISCHARGE.—1907–1917: Maximum stage reported, 11.8 feet February 2, 1909 (discharge, 7,060 second-feet); minimum stage, dry during parts of every year.

DIVERSIONS.—No information.

REGULATION.—East Park reservoir is used for storage for the Orland project of the United States Reclamation Service.

COOPERATION.—Daily-discharge record furnished by United States Reclamation Service, through A. N. Burch, project manager.

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5.0	1.0	12	30	254	30	41	27
2	5.0	1.0	58	39	191	64	39	20
3	5.0	2.0	81	26	163	181	52	16
4	5.0	200	91	33	135	81	34	16
5	5.0	5.7	83	63	128	91	30	20
6	5.0	9.9	117	8.9	123	70	58	18
7	5.0	27	143	45	133	108	38	20
8	5.0	26	67	44	116	45	28	16
9	2.0	18	48	34	132	67	36	19
10	2.0	15	40	38	90	54	43	14
11	.....	22	32	61	108	192	39	16
12	.....	18	40	43	180	130	55	14
13	.....	12	10	35	34	130	42	16
14	.....	0.4	38	50	36	112	42	14
15	.....	1.0	23	39	89	108	38	14
16	.....	1.0	25	33	48	108	32	8.0
17	.....	31	45	22	79	92	34	8.0
18	.....	12	30	28	85	104	28	8.0
19	.....	4.2	30	21	84	94	30	7.0
20	.....	1.4	28	27	97	88	28	9.0
21	.....	2.6	18	26	60	72	30	6.0
22	.....	2.1	13	512	57	78	26	13
23	.....	30	15	132	60	133	26	11
24	.....	64	22	860	41	105	26	5.5
25	.....	47	23	3,590	75	105	20	5.5
26	.....	41	24	1,060	88	88	26	3.0
27	.....	14	25	536	76	64	29	2.0
28	.....	32	15	325	66	104	29	2.5
29	.....	24	46	.....	68	66	29	4.5
30	.....	24	59	.....	75	30	29	4.5
31	.....	27	51	.....	100	.....	32	.....

NOTE.—No flow Oct. 11 to Nov. 30 and July 1 to Sept. 30.

Monthly discharge of Little Stony Creek near Lodoga, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	5.0	0.0	1.42	0.014	0.02	87.3
November	.0	.0	.0	.0	.0	.0
December	200	.4	23.1	.226	.26	1,420
January	143	10	43.9	.430	.50	2,700
February	3,590	8.9	279	2.73	2.84	15,400
March	254	34	99.1	.972	1.12	6,090
April	192	30	93.3	.915	1.02	5,550
May	58	20	34.5	.338	.39	2,120
June	27	2.0	11.9	.117	.13	708
July	.0	.0	.0	.0	.0	.0
August	.0	.0	.0	.0	.0	.0
September	.0	.0	.0	.0	.0	.0
The year	3,590	.0	47.1	.462	6.28	34,100

FEATHER RIVER AND TRIBUTARIES.

NORTH FORK OF FEATHER RIVER NEAR PRATTVILLE, CALIF.

LOCATION.—In sec. 28, T. 27 N., R. 8 E., below Great Western Power Co.'s dam at Big Meadows, 4 miles above mouth of Butt Creek and about 5 miles southeast of Prattville, Plumas County.

DRAINAGE AREA.—506 square miles above dam site.

RECORDS AVAILABLE.—June 13, 1905, to September 30, 1917.

GAGE.—Vertical staff in flume about 500 feet below the dam. Original gage, a Friez water-stage recorder about on the south line of section 21 (above the dam), was moved downstream about 1,300 feet April 29, 1912, moved again about 2,200 feet downstream July 31, 1912, and was discontinued March 21, 1914, when the station was moved to present site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made in flume at gage.

CHANNEL AND CONTROL.—No information.

EXTREMES OF DISCHARGE.—1905–1917: Maximum stage recorded, 16.2 feet, crest of flood, March 19, 1907 (discharge, 10,000 second-feet); minimum stage, dry April 15 and 16, 1914 (water being stored).

DIVERSIONS.—No information.

REGULATION.—Since March 7, 1914, the record shows the amount of water released from Big Meadows reservoir. There was 137,000 acre-feet of water in reservoir September 30, 1916, and 135,000 acre-feet September 30, 1917.

COOPERATION.—Record of discharge and storage furnished by Great Western Power Co., through P. W. Ham, chief engineer.

Daily discharge, in second-feet, of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,450	1,760	1,230	898	917	300	300	300	300	563	1,640	1,810
2	1,640	1,610	800	1,070	956	300	300	300	300	702	1,630	1,720
3	1,640	1,590	354	1,070	916	300	300	508	300	738	1,600	1,870
4	1,610	1,530	400	1,030	898	300	300	800	300	637	1,540	1,870
5	1,610	1,330	400	972	1,040	300	300	800	300	811	1,490	1,840
6	1,610	1,180	400	864	1,020	300	300	800	300	1,090	1,640	1,870
7	1,580	1,110	400	827	998	300	171	800	300	861	1,630	1,910
8	1,390	1,130	400	976	1,040	300	177	800	300	925	1,620	1,800
9	1,520	1,240	642	1,160	1,020	300	177	800	300	1,350	1,720	1,720
10	1,520	1,390	645	1,110	960	300	122	800	300	1,140	1,780	1,880
11	1,540	1,320	815	1,110	824	300	191	800	300	1,180	1,610	1,860
12	1,520	1,340	1,170	1,110	962	342	340	800	300	1,200	1,620	1,880
13	1,570	1,350	1,100	1,060	1,020	333	317	800	300	1,210	1,850	1,880
14	1,440	1,320	1,120	994	985	350	270	800	300	1,230	1,810	1,920
15	1,300	1,360	1,220	1,450	1,020	350	270	800	300	1,180	1,770	1,850
16	1,420	1,390	1,080	1,450	972	379	270	983	300	1,280	1,740	1,740
17	1,480	1,410	951	1,420	874	425	545	1,550	300	1,230	1,740	1,910
18	1,590	1,400	1,070	1,400	765	400	750	1,800	300	1,300	1,690	1,880
19	1,620	1,380	1,150	1,320	880	492	750	1,800	300	1,360	1,670	1,890
20	1,580	1,440	1,100	1,070	1,020	488	749	1,800	300	1,420	1,780	1,960
21	1,590	1,440	1,080	1,020	757	446	1,000	1,450	342	1,290	1,870	1,980
22	1,420	1,450	1,030	1,170	340	417	1,000	1,300	1,030	1,220	1,920	1,860
23	1,590	1,490	837	1,380	340	368	717	1,300	1,320	1,380	1,880	1,740
24	1,580	1,570	835	1,300	340	350	200	1,300	956	1,410	1,880	1,930
25	1,610	1,440	1,040	1,300	340	350	200	1,380	677	1,500	1,790	1,900
26	1,630	1,010	704	1,310	340	319	556	1,840	687	1,500	1,690	1,930
27	1,610	817	1,030	1,300	312	300	800	1,900	1,320	1,500	1,820	1,960
28	1,610	925	1,020	1,200	300	300	800	2,010	597	1,420	1,820	1,980
29	1,440	946	1,060	1,110	.....	300	571	2,050	675	1,360	1,900	1,840
30	1,610	977	975	857	.....	300	300	2,050	727	1,600	1,880	1,790
31	1,610	.....	825	865	.....	300	.....	883	.....	1,620	1,890	.....

NOTE.—Quantities changed slightly to conform to the computation rules of U. S. Geological Survey.

Monthly discharge of North Fork of Feather River near Prattville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.				Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	Mean stored in reservoir.[a]	
October	1,640	1,300	1,550	− 672	95,300
November	1,760	817	1,320	− 470	78,500
December	1,230	354	867	− 54	53,300
January	1,450	827	1,130	− 352	69,500
February	1,040	300	791	+ 73	43,900
March	492	300	342	+ 514	21,000
April	1,000	122	435	+1,630	25,900
May	2,050	300	1,160	+1,120	71,300
June	1,320	300	478	+ 879	28,400
July	1,620	563	1,200	− 557	73,800
August	1,920	1,490	1,740	−1,030	107,000
September	1,980	1,720	1,870	−1,090	111,000
The year	2,050	122	1,080	.....	779,000

[a] The discharge in this column, added to that in the column of "Means," gives the estimated unregulated discharge.

NOTE.—Monthly and yearly discharge, except "Mean stored in reservoir," computed by engineers of U. S. Geological Survey.

NORTH FORK OF FEATHER RIVER AT BIG BAR, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 23 N., R. 5 E., one-fourth mile above Big Bar station on Western Pacific Railroad, Butte County, and about 7 miles above intake of Great Western Power Co.'s power plant at Big Bend.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 24, 1911, to September 30, 1917.

GAGE.—Bristol water-stage recorder. Original gage was a staff installed July, 1910, opposite the middle of Jesse Moore Bar. January 17, 1911, station was moved 300 feet upstream and the Bristol water-stage recorder was installed; gage datum, 1,347.96 feet above sea level (United States Geological Survey datum). In November, 1912, the Bristol gage was moved upstream 130 feet; gage datum now 1,348.96 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage.

CHANNEL AND CONTROL.—Solid rock, boulders, and gravel; practically permanent.

EXTREMES OF DISCHARGE.—1911–1917: Maximum daily discharge, 35,000 second-feet January 1, 1914; minimum daily discharge, 836 second-feet October 18, 1913.

DIVERSIONS.—No information.

REGULATION.—Flow partly regulated by Big Meadows reservoir.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co., through P. W. Ham, chief engineer.

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Daily discharge, in second-feet, of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,800	2,020	1,950	1,760	1,840	4,940	4,260	6,510	4,990	2,100	2,260	2,370
2	2,040	2,020	3,150	2,010	1,830	3,980	3,800	6,250	4,900	2,170	2,250	2,430
3	2,150	1,970	4,640	1,970	1,840	3,450	3,750	6,210	4,740	2,240	2,150	2,500
4	2,040	2,220	5,920	1,940	1,750	3,220	3,760	6,580	4,920	1,990	2,100	2,480
5	2,030	2,260	3,800	1,950	1,920	3,100	4,160	6,720	4,830	2,140	2,260	2,420
6	2,000	2,150	3,220	1,820	1,940	3,050	4,840	7,110	4,750	2,200	2,320	2,320
7	2,160	1,930	2,510	1,670	1,900	2,840	5,890	7,570	4,720	2,190	2,310	2,250
8	1,910	1,790	2,120	1,850	1,940	2,800	7,540	7,760	4,830	1,960	2,310	2,180
9	2,000	1,840	1,950	2,020	1,870	2,760	7,290	7,760	4,750	2,340	2,390	2,060
10	2,000	1,930	2,060	1,950	1,880	2,680	6,940	7,650	4,360	2,320	2,470	2,120
11	1,990	1,900	1,960	1,900	1,770	2,550	9,110	7,700	4,330	2,230	2,350	2,130
12	1,940	1,880	2,170	1,870	1,820	2,590	11,900	7,620	4,150	2,220	2,370	2,120
13	1,940	1,810	2,290	1,870	1,900	2,550	9,850	8,040	4,020	2,120	2,480	2,100
14	1,880	1,900	2,090	1,700	1,950	2,370	6,970	7,960	3,930	2,220	2,490	2,090
15	1,880	1,880	2,110	2,020	1,940	2,340	5,690	7,230	3,870	2,130	2,450	2,080
16	1,860	1,870	2,060	2,220	1,970	2,220	4,900	6,570	3,930	2,260	2,370	2,060
17	1,910	1,880	1,790	2,190	1,940	2,260	4,420	6,860	3,840	2,200	2,320	2,050
18	1,910	1,870	1,950	2,080	1,770	2,300	4,460	6,800	3,520	2,170	2,260	2,150
19	2,040	1,850	2,030	2,100	1,880	2,480	4,220	6,300	3,340	2,190	2,090	2,130
20	2,010	1,940	2,040	1,940	2,010	2,550	4,020	5,990	3,130	2,200	2,240	2,100
21	1,900	1,960	2,020	1,620	3,160	2,760	4,880	5,880	2,710	2,220	2,260	2,100
22	1,800	1,920	1,950	1,770	4,100	2,630	10,800	5,610	2,750	2,020	2,260	2,120
23	1,890	1,900	1,960	1,900	3,470	2,510	14,300	5,620	3,040	2,120	2,210	2,130
24	1,910	1,930	1,780	1,950	11,100	2,590	12,800	5,600	2,770	2,150	2,140	2,130
25	1,970	2,170	2,040	1,870	33,700	2,760	12,500	5,840	2,840	2,250	2,100	2,130
26	1,930	2,850	1,690	1,970	14,900	2,840	12,800	5,750	2,600	2,240	1,960	2,120
27	1,930	2,120	1,820	1,940	8,140	3,140	11,900	5,820	2,960	2,200	2,190	2,110
28	1,940	2,040	1,900	1,820	5,820	3,900	9,940	6,140	2,680	2,170	2,200	2,100
29	1,840	1,850	1,920	2,210	.....	5,110	8,250	6,700	2,170	1,900	2,270	2,140
30	1,870	1,890	1,870	2,080	.....	6,810	7,020	6,770	2,360	2,100	2,350	2,190
31	1,870	.....	1,690	2,000	.....	5,180	.....	6,010	.....	2,220	2,320	.....

NOTE.—Quantities changed slightly to conform to computation rules of U. S. Geological Survey.

Monthly discharge of North Fork of Feather River at Big Bar, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	2,160	1,800	1,950	120,000
November	2,850	1,790	1,980	118,000
December	5,920	1,690	2,340	144,000
January	2,220	1,620	1,930	119,000
February	33,700	1,750	4,360	242,000
March	6,810	2,220	3,140	193,000
April	14,300	3,750	7,430	442,000
May	8,040	5,600	6,680	411,000
June	4,990	2,170	3,760	224,000
July	2,340	1,900	2,170	133,000
August	2,490	1,960	2,270	140,000
September	2,500	2,050	2,180	130,000
The year	33,700	1,620	3,340	2,420,000

NOTE.—Monthly and yearly discharge computed by engineers of U. S. Geological Survey.

FEATHER RIVER AT OROVILLE, CALIF.

LOCATION.—In sec. 8, T. 19 N., R. 4 E., at highway bridge at Oroville, Butte County, 6 miles below junction of North and Middle forks and 30 miles above mouth of Yuba River.

DRAINAGE AREA.—3,640 square miles.

RECORDS AVAILABLE.—January 1, 1902, to September 30, 1917.

GAGE.—Friez water-stage recorder on right bank 200 feet below bridge at same datum as United States Weather Bureau vertical staff, which is in two sections on pier of highway bridge near right bank. Weather Bureau gage was used 1902 to 1905 with 2 feet added to the readings to reference them to the datum of the United States Geological Survey staff gage installed on left bank about 1,000 feet above the bridge in December, 1905. The latter gage was washed out several times, and until repaired, the Weather Bureau gage was used. December 16, 1912, the present water-stage recorder was put in operation.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above bridge. At extreme low water measurements have been made from a boat about 1,000 feet below the bridge.

CHANNEL AND CONTROL.—Boulders and gravel; somewhat shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 16.15 feet at 10 a. m. February 25 (discharge, 110,000 second-feet); minimum stage from water-stage recorder, 0.79 foot at 9 a. m. September 30 (discharge, 1,340 second-feet).

1902–1917: Maximum stage recorded, 30.2 feet on Weather Bureau gage; 39.3 feet on gage 1,000 feet above, March 19, 1907 (discharge, 187,000 second-feet) minimum stage from water-stage recorder, −0.13 foot at 10 a. m. October 7, 1913; (discharge, 790 second-feet).

DIVERSIONS.—Minor diversion from tributaries above the station.

STORAGE.—See North Fork of Feather River near Prattville, Calif.

REGULATION.—The operation of the Big Bend plant of the Great Western Power Co. causes diurnal fluctuations in stage, especially during extremely low water, when it amounts to about a foot.

ACCURACY.—Stage-discharge relation has not changed since May 12, 1915. Rating curve well defined above 1,400 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained with discharge integrator or, for days of wide range in stage, by averaging results obtained by applying mean gage height of two-hourly intervals to rating table. Records excellent

Discharge measurements of Feather River at Oroville, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 20	Charles Leidl	2.15	2,610
July 16	J. F. Kunesh	2.59	3,280
Sept. 26	.....do	2.20	2,680

Daily discharge, in second-feet, of Feather River at Oroville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,450	2,430	2,800	2,710	2,940	12,800	9,900	16,700	11,300	3,200	2,410	2,250
2	2,760	2,550	5,960	3,620	2,920	10,400	8,700	15,400	11,400	3,320	2,450	2,000
3	2,910	2,440	12,800	3,950	2,820	8,450	8,170	14,800	10,900	3,250	2,480	2,170
4	2,980	2,630	25,000	4,010	2,670	7,730	8,170	15,300	10,200	2,900	2,490	2,360
5	2,800	3,460	9,980	4,050	2,770	6,970	9,300	16,100	9,800	3,040	2,220	2,310
6	2,800	3,140	8,040	3,350	2,880	6,550	11,400	16,900	9,800	3,050	2,400	2,280
7	3,230	2,870	5,460	3,090	2,830	6,290	13,400	19,600	9,900	3,050	2,350	2,290
8	3,140	2,540	4,390	3,350	2,900	6,000	18,660	19,000	10,300	2,900	2,360	2,300
9	3,050	2,390	3,960	3,150	2,900	6,700	17,700	20,700	10,800	2,940	2,400	2,060
10	2,960	2,420	3,630	3,050	2,900	5,980	13,900	19,300	10,500	2,960	2,390	2,210
11	2,870	2,430	3,600	2,970	2,550	5,420	26,600	20,200	8,800	2,880	2,380	2,370
12	2,790	2,240	3,350	3,000	3,000	5,140	38,300	19,200	7,620	2,850	2,180	2,350
13	2,700	2,320	3,300	2,830	2,980	5,180	25,300	19,600	7,000	2,820	2,320	2,290
14	2,620	2,340	3,280	2,600	2,980	5,200	20,100	20,400	6,900	2,800	2,320	2,310
15	2,520	2,330	3,180	2,760	2,950	4,840	15,900	17,900	6,840	2,500	2,460	2,270
16	2,440	2,320	3,200	2,820	3,080	4,730	13,300	14,800	6,730	2,730	2,400	1,970
17	2,410	2,350	2,830	2,870	3,200	4,550	11,300	14,900	6,710	2,870	2,370	2,170
18	2,410	2,410	3,050	2,970	2,810	4,380	10,300	15,000	6,350	2,860	2,290	2,210
19	2,380	2,180	2,870	3,050	3,040	4,700	9,350	13,200	6,080	2,760	2,390	2,220
20	2,460	2,320	2,940	2,950	3,310	4,780	9,190	12,000	5,800	2,710	2,400	2,250
21	2,360	2,380	2,930	2,480	9,900	4,960	9,850	11,600	5,380	2,640	2,340	2,240
22	2,180	2,410	2,900	2,720	13,900	5,140	26,800	11,100	5,090	2,390	2,350	2,230
23	2,320	2,450	3,500	2,690	10,000	4,760	39,300	11,500	5,280	2,530	2,360	2,130
24	2,440	2,500	4,100	2,720	50,600	4,880	35,500	11,500	5,130	2,530	2,380	2,320
25	2,400	2,600	3,570	2,720	99,000	4,950	33,800	12,700	4,520	2,580	2,350	2,400
26	2,440	4,920	3,480	2,770	50,000	5,470	33,100	11,400	4,140	2,480	2,180	2,320
27	2,490	4,150	3,010	2,770	27,900	5,800	30,100	11,100	3,950	2,500	2,410	2,350
28	2,430	2,650	3,150	2,430	18,100	7,630	26,100	11,500	4,330	2,480	2,320	2,250
29	2,300	2,850	3,180	3,420	.....	11,900	21,600	13,400	3,470	2,260	2,320	2,210
30	2,390	2,640	3,200	3,570	.....	16,200	18,600	14,100	3,410	2,450	2,300	2,000
31	2,380	.....	2,660	3,310	.....	12,800	.....	13,600	.....	2,430	2,300	.....

NOTE.—Discharge, Oct. 8–15, interpolated.

Monthly discharge of Feather River at Oroville, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	3,230	2,180	2,610	0.717	0.83	160,000
November	4,920	2,180	2,660	.731	.82	158,000
December	25,000	2,660	4,820	1.32	1.52	296,000
January	4,050	2,430	3,060	.841	.97	188,000
February	99,000	2,550	12,100	3.32	3.46	672,000
March	16,200	4,380	6,820	1.87	2.16	419,000
April	39,300	8,170	19,100	5.25	5.86	1,140,000
May	20,700	11,100	15,300	4.20	4.84	941,000
June	11,400	3,410	7,280	2.00	2.23	433,000
July	3,320	2,260	2,760	.758	.87	170,000
August	2,490	2,180	2,360	.648	.75	145,000
September	2,400	1,970	2,240	.615	.69	133,000
The year	99,000	1,970	6,700	1.84	25.00	4,860,000

BUTT CREEK AT BUTTE VALLEY, CALIF.

LOCATION.—At lower end of Butte Valley, 100 feet below footbridge, 1,000 feet above intake to Great Western Power Co.'s diversion flume, one-fourth mile south of Butte Valley post office, Plumas County, and 2 miles above junction with North Fork of Feather River.

DRAINAGE AREA.—73 square miles at original station.

RECORDS AVAILABLE.—June 14, 1905, to September 30, 1917.

GAGE.—Vertical staff on left bank, installed July 19, 1912, seven-eighths of a mile upstream from original vertical staff which was on right bank. This gage is out of the influence of the low water diversion dam near the flume intake for the Great Western Power Co.'s Butt Creek plant.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Sand, gravel and clay; practically permanent.

EXTREMES OF DISCHARGE.—1905–1917: Maximum daily discharge, 1,640 second-feet January 16, 1909; minimum daily discharge, 21 second-feet August 4–8, 1908.

DIVERSIONS.—Water is diverted from Butt Creek above the station into Yellow Creek watershed through Wallack ditch by Pacific Gas & Electric Co.; capacity of ditch 15 to 20 second-feet.

REGULATION.—No information.

COOPERATION.—Daily-discharge record furnished by Great Western Power Co. through P. W. Ham, chief engineer.

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	41	45	55	78	222	141	269	203	56	33	25
2	43	42	77	54	73	170	153	255	200	54	33	25
3	51	41	155	55	75	144	156	256	176	52	34	25
4	46	59	167	53	69	130	163	253	184	50	31	25
5	43	89	146	51	66	122	199	257	173	47	28	25
6	42	66	100	44	40	97	243	262	176	45	29	25
7	67	56	94	40	35	86	254	295	176	44	29	25
8	58	52	74	41	34	81	336	280	180	43	29	25
9	54	51	68	43	34	91	266	296	181	42	29	25
10	50	51	63	43	33	74	225	282	176	42	29	26
11	51	51	63	45	32	71	376	280	157	40	29	27
12	46	46	52	47	32	69	389	265	139	39	29	26
13	43	52	41	50	32	56	289	278	129	38	29	26
14	42	54	50	53	32	82	260	270	124	38	29	26
15	42	47	52	54	32	62	213	249	121	42	30	25
16	42	45	52	56	35	57	189	228	119	39	31	24
17	42	43	54	58	38	57	170	229	116	39	30	24
18	42	45	38	60	32	57	168	242	109	37	29	24
19	42	42	36	75	36	57	160	199	107	36	29	24
20	42	40	34	78	41	61	176	188	101	34	29	23
21	41	39	36	86	54	73	184	186	96	36	29	23
22	41	37	37	94	83	71	430	184	91	35	27	27
23	41	39	21	90	112	69	418	176	87	35	27	28
24	41	40	47	87	141	69	408	174	81	35	27	28
25	41	42	53	87	590	86	410	207	76	34	28	27
26	41	156	58	88	506	100	399	185	69	33	30	26
27	41	82	60	85	424	115	365	175	64	33	31	26
28	41	68	57	79	292	145	352	179	60	33	28	25
29	41	54	57	84	.....	222	306	226	59	33	27	25
30	41	48	56	73	.....	213	296	216	58	33	27	25
31	41	.....	56	69	.....	173	.....	206	.....	33	26	.....

Monthly discharge of Butt Creek at Butte Valley, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	67	40	44.5	2,740
November	156	37	53.9	3,210
December	167	21	64.5	3,970
January	94	40	63.8	3,920
February	590	32	110	6,110
March	222	56	103	6,330
April	430	141	270	16,100
May	296	174	234	14,400
June	203	58	126	7,500
July	56	33	39.7	2,440
August	34	26	29.2	1,800
September	28	23	25.3	1,510
The year	590	21	96.6	70,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

INDIAN CREEK NEAR CRESCENT MILLS, CALIF.

LOCATION.—In SW. ¼ sec. 25, T. 26 N., R. 9 E., at lower end of Indian Valley, 2,000 feet below Arlington Bridge, and 1¼ miles below Crescent Mills, Plumas County, Spanish Creek enters 4 miles below station.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—January 1, 1906, to December 31, 1909; September 10, 1911, to September 30, 1917.

GAGE.—Vertical staff in three sections on right bank near observer's house; read by Charles Quigley. Same location and datum used throughout record, but lowest section was 0.46 foot too low from 1911 to August 12, 1915.

DISCHARGE MEASUREMENTS.—Made from cable, 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent. At low stages water is deep and sluggish at gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.4 feet at 5 p. m. April 24 (discharge, from extension of rating curve, about 5,320 second-feet); minimum stage recorded, 0.65 foot at 5 p. m. August 18 (discharge, 20 second-feet).

1906–1917: Maximum stage recorded, 20.2 feet at 6.30 a. m., crest of flood of March 19, 1907 (discharge, from extension of rating curve, about 11,700 second-feet); minimum stage recorded, 0.75 foot, August 9–15, 1908 (discharge, 12 second-feet).

DIVERSIONS.—Water is diverted from Indian Creek for irrigation in Indian and Genesee valleys.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during year. Rating curve well defined between 30 and 4,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Indian Creek near Crescent Mills, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	Charles Leidl	1.40	91	May 27	J. F. Kunesh	4.96	1,230
25	do	1.41	99	27	do	4.96	1,250
Mar. 13	do	3.03	403	Sept. 19	Charles Leidl	.82	31
				19	do	.82	33

Daily discharge, in second-feet, of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	87	132	148	171	815	1,200	2,550	1,200	240	50	31
2	58	87	322	148	187	658	895	2,370	1,140	240	50	34
3	72	84	486	155	179	552	1,080	2,280	1,140	179	50	35
4	71	101	454	155	179	552	1,140	2,280	1,080	163	50	30
5	66	155	518	163	179	518	1,390	2,280	1,040	163	48	32
6	69	155	454	155	221	486	2,280	2,280	985	163	50	30
7	84	132	322	155	300	486	2,740	2,550	985	155	40	30
8	79	125	240	155	346	486	3,940	2,460	985	148	30	29
9	76	118	221	140	280	486	3,430	2,550	985	140	28	30
10	101	118	179	140	212	486	2,460	2,640	940	125	25	32
11	104	118	171	148	212	396	2,640	2,640	940	125	24	31
12	101	111	171	140	221	370	3,730	2,640	855	125	27	31
13	96	93	155	132	240	586	3,230	2,550	735	110	26	32
14	94	101	148	118	240	396	2,740	2,550	658	110	24	32
15	88	101	140	118	240	370	1,930	2,370	658	132	24	31
16	87	100	132	111	240	346	1,840	2,020	586	132	23	27
17	87	103	132	110	240	346	1,530	1,930	586	132	21	28
18	88	108	132	108	454	370	1,200	1,760	586	132	20	32
19	80	107	140	110	454	396	1,530	1,530	518	118	22	32
20	80	107	148	111	518	454	1,390	1,320	486	118	23	30
21	80	101	148	111	735	518	1,840	1,260	424	111	22	30
22	80	101	148	111	855	486	3,330	1,200	396	100	21	31
23	80	110	155	111	985	486	4,990	1,140	370	88	21	31
24	76	110	132	125	1,140	454	5,320	1,320	346	83	21	30
25	80	101	132	125	4,880	586	5,210	1,260	322	76	21	30
26	80	196	132	125	3,230	586	4,670	1,200	300	76	28	31
27	82	179	132	125	1,760	658	4,560	1,140	280	72	26	31
28	82	171	148	132	1,040	735	3,730	1,140	250	56	26	30
29	82	163	148	132	.....	1,320	2,840	1,200	230	45	35	32
30	82	140	132	300	.....	1,390	2,640	1,260	204	44	34	32
31	83	.....	148	221	.....	1,260	.....	1,200	.....	49	31	.....

Monthly discharge of Indian Creek near Crescent Mills, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	104	53	81.3	5,000
November	196	84	119	7,080
December	518	132	205	12,600
January	300	108	140	8,610
February	4,880	171	712	39,500
March	1,390	346	582	35,800
April	5,320	895	2,710	161,000
May	2,640	1,140	1,900	117,000
June	1,200	204	674	40,100
July	240	44	121	7,440
August	50	20	30.4	1,870
September	35	27	30.9	1,840
The year	5,320	20	605	438,000

SPANISH CREEK AT KEDDIE, CALIF.

LOCATION.—In SW. ¼ sec. 22, T. 25 N., R. 9. E., at highway bridge at Keddie, Plumas County, 2 miles above junction with Indian Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1917.

GAGE.—Vertical staff in three sections. First section is on right bank 50 feet above bridge; second section on left bank 20 feet below bridge: third section fastened to downstream side of left bridge pier. Gage used previous to August 12, 1914, consisted of high-water section painted on left abutment of bridge and a vertical staff for low-water readings fastened to a stump on left bank 20 feet below bridge. Gage read by C. O. Phillips.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet February 25 (discharge, from extension of rating curve, about 4,800 second-feet); minimum stage recorded, 1.2 feet September 19 (discharge, 33 second-feet).

1911–1917: Maximum stage recorded, 10.0 feet at 11 a. m. December 31, 1913, and 1 p. m. January 2, 1914 (discharge, from extension of rating curve, about 9,450 second-feet); minimum stage recorded, 1.1 feet July 24–30, 1914 (discharge, 22 second-feet).

DIVERSIONS.—Water is diverted from Spanish Creek for irrigation in American Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 25. Rating curve before change fairly well defined below 2,000 second-feet and extended above; curve after change well defined between 20 and 600 second-feet and extended above. Gage read to nearest quarter foot until August 11 and to half-tenths after that date. Daily discharge ascertained by applying gage height to rating table. Records poor to August 11, and fair thereafter.

Discharge measurements of Spanish Creek at Keddie, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 26	Charles Leidl	3.06	360	May 27	J. F. Kunesh	3.39	532
29	do	1.80	104	Sept. 19	Charles Leidl	a 1.20	33
Mar. 13	do	2.55	253	19	do	a 1.20	33

a New gage installed Sept. 16, 1917, 250 feet below gage used until Sept. 30, 1917, read 3.23 feet.

Daily discharge, in second-feet, of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	65	65	220	132	220	930	590	930	380	182	136	43
2	65	65	665	132	220	590	590	930	380	182	136	43
3	65	65	340	132	220	590	930	930	380	136	136	43
4	65	65	220	132	220	380	930	930	380	136	136	43
5	65	65	220	132	220	380	930	930	380	136	66	43
6	65	132	220	132	220	380	930	930	380	136	66	43
7	65	132	220	132	220	380	930	930	348	136	66	43
8	65	132	220	132	220	380	590	930	348	136	66	43
9	65	132	172	132	220	380	590	930	348	136	66	43
10	65	132	132	132	220	380	590	930	348	136	66	43
11	65	132	132	132	220	380	3,300	930	348	136	66	43
12	65	132	132	132	220	380	3,300	930	304	136	43	43
13	65	132	132	132	220	380	1,960	930	304	136	43	43
14	65	132	132	132	220	380	1,400	930	304	136	43	43
15	65	132	172	132	220	380	1,400	930	304	136	43	43
16	65	132	172	132	220	590	1,400	930	304	136	43	43
17	65	132	132	132	220	590	1,400	745	304	136	43	43
18	65	132	132	132	274	590	930	745	238	136	43	43
19	65	132	132	172	274	590	930	745	238	136	43	43
20	65	132	132	172	274	590	930	745	238	136	43	33
21	65	132	132	172	274	590	930	745	238	136	43	33
22	65	132	132	172	635	380	3,300	745	238	136	43	33
23	65	132	132	220	530	380	3,300	745	238	136	43	43
24	65	132	132	220	530	380	2,590	745	238	136	43	43
25	65	132	132	220	4,800	380	1,960	745	182	136	43	43
26	65	132	132	220	2,590	380	1,960	745	182	136	43	43
27	65	132	132	274	930	380	1,400	745	182	136	43	43
28	65	132	132	340	930	380	1,400	380	182	136	43	43
29	220	220	132	340	.....	471	930	380	182	136	43	43
30	65	220	132	340	.....	471	930	380	182	136	43	43
31	65	.....	132	220	.....	471	.....	380	.....	136	43	.....

NOTE.—No record Nov. 19–25 and Dec. 24–31; discharge interpolated.

Monthly discharge of Spanish Creek at Keddie, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	220	65	70.0	4,300
November	220	65	127	7,560
December	665	132	177	10,900
January	340	132	176	10,800
February	4,800	220	564	31,300
March	930	380	461	28,300
April	3,300	590	1,440	85,700
May	930	380	793	48,800
June	380	182	287	17,100
July	182	136	139	8,550
August	136	43	60.2	3,700
September	43	33	42.2	2,510
The year	4,800	33	359	260,000

MIDDLE FORK OF FEATHER RIVER AT SLOAT, CALIF.

LOCATION.—Half a mile above Sloat, Plumas County, three-fourths mile above mouth of Poplar Creek, and about 1½ miles below Cromberg.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 3, 1910, to September 30, 1917.

GAGE.—Gurley seven-day water-stage recorder on right bank installed September 11, 1917. From December 5, 1913, to September 11, 1917, record is from a Gurley electric printing water-stage recorder; original gage at California White Pine Co.'s log chute at Cromberg. Several changes in gage at that site were made, but all gages were on downstream side of log chute piers and original datum maintained. Gage at new site has different datum. During construction of recorder well (November 9 to December 4, 1913) a staff gage was read at new site, new datum. Water-stage recorder inspected by George Langhorst.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; practically permanent. Left bank flat and timbered; submerged at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.75 feet at 10 p. m. March 29 (discharge, 4,040 second-feet); minimum stage, 2.60 feet from 11 a. m. to 1 p. m. September 15 (discharge, 50 second-feet).

1910–1917: Maximum stage recorded, 13.0 feet April 7, 1911 (discharge, 9,640 second-feet); minimum stage recorded, 2.2 feet September 17–29, 1913 (discharge, 44 second-feet).

ICE.—Stage-discharge relation slightly affected by ice for very short periods.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation has not changed since station was relocated in 1913; not affected by ice 1916-17. Rating curve well defined below 6,000 second-feet but extended above. Mean daily gage height determined by averaging readings from the printing water-stage recorder or by inspecting graph from the seven-day water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those obtained by estimation, which are fair (see footnote to daily-discharge table).

Discharge measurements of Middle Fork of Feather River at Sloat, Calif., during the year ending Sept. 30, 1917.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 27	3.20	194	Sept. 14	2.62	51
28	3.19	179	14	2.62	51
Mar. 6	4.19	687			

Daily discharge, in second-feet, of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	87	74	142	145	157	1,400	2,180	1,980	1,150	350	87	.....
2	87	74	246	145	178	1,200	1,780	1,720	1,160	340	.....	.....
3	85	74	430	140	163	1,000	1,720	1,660	1,150	330	.....	.....
4	81	79	832	138	163	850	1,720	1,780	1,070	314	.....	.....
5	77	118	620	138	163	776	1,910	1,720	1,050	294	.....	.....
6	81	98	526	135	166	776	2,110	1,780	1,050	286	.....	.....
7	91	102	466	125	169	849	2,100	1,840	1,040	270	.....	.....
8	85	91	410	132	169	894	2,560	1,720	1,190	266	.....	.....
9	85	89	390	120	175	746	2,100	1,840	1,300	262	.....	.....
10	81	91	314	112	175	599	1,800	1,910	1,260	254	.....	.....
11	81	91	262	110	178	520	1,900	1,840	1,060	238	.....	53
12	79	87	234	112	182	466	3,600	1,780	876	210	.....	51
13	77	91	200	102	169	442	2,600	1,910	824	192	.....	51
14	75	93	182	108	115	385	2,200	1,980	824	189	.....	51
15	74	89	172	112	108	340	1,800	1,660	849	182	.....	51
16	72	85	163	118	128	322	1,480	1,380	876	169	.....	51
17	72	83	160	135	154	326	1,270	1,320	894	163	.....	51
18	70	75	151	151	140	330	1,050	1,220	876	151	.....	51
19	72	75	154	157	157	350	970	1,100	824	142	.....	51
20	74	75	157	157	145	395	940	1,040	784	135	.....	51
21	75	77	157	175	151	502	940	1,000	732	130	.....	52
22	74	79	172	154	380	550	1,900	1,030	648	122	.....	52
23	72	81	182	163	290	550	2,770	1,000	571	112	.....	56
24	72	85	182	160	676	613	2,850	1,050	526	108	.....	57
25	70	91	189	160	2,110	768	3,090	1,120	496	102	.....	57
26	72	218	178	163	2,020	966	3,090	957	472	98	.....	57
27	72	169	182	166	1,930	1,280	2,850	885	442	95	.....	56
28	72	172	170	169	1,840	1,910	2,540	984	420	93	.....	56
29	72	157	158	175	.....	3,090	2,180	1,120	390	91	.....	55
30	72	145	146	189	.....	3,170	2,040	1,180	365	91	.....	53
31	72	.....	135	154	.....	2,700	.....	1,180	.....	89	.....	.....

NOTE.—Discharge for days of no record ascertained as follows: Dec. 28–30 and Feb. 26–27 interpolated; Mar. 1–5, Apr. 7–16 and 18–22, estimated from records of run-off near Oroville and Indian Creek at Crescent Mills. No record Aug. 2 to Sept. 10, mean discharge for August estimated from run-off near Oroville as 75 second-feet and Sept. 1–10 as 55 second-feet.

Monthly discharge of Middle Fork of Feather River at Sloat, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	91	70	76.8	4,720
November	218	74	100	5,950
December	832	135	260	16,000
January	189	102	143	8,790
February	2,110	108	448	24,900
March	3,170	322	938	57,700
April	3,600	940	2,070	123,000
May	1,980	885	1,440	88,500
June	1,300	365	839	49,900
July	350	89	189	11,600
August	.....	.....	a75	4,610
September	.....	.....	a53.8	3,200
The year	3,600	.....	551	399,000

aEstimated.

MIDDLE FORK OF FEATHER RIVER NEAR OROVILLE, CALIF.

LOCATION.—In NW. ¼ sec. 32, T. 20 N., R. 5 E., at highway bridge at Bidwell Bar, 2 miles above junction with North Fork, and 7 miles northeast of Oroville, Butte County. Canyon Creek enters three-fourths mile below and South Fork 1½ miles above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1911, to September 30, 1917.

GAGE.—Vertical staff in three sections: high-water section fastened to lower end of bridge pier near left bank; other sections fastened to a sycamore tree on left bank, 100 feet above bridge; read by T. W. Curry.

DISCHARGE MEASUREMENTS.—Made from cable 250 feet below bridge.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet at 8 a. m. February 25 (discharge, 20,400 second-feet); minimum stage recorded, 2.18 feet at 8 a. m. September 21 (discharge, 206 second-feet).

1911–1917: Maximum stage recorded, 18.0 feet at 4. p. m. December 31, 1913 (discharge, from extension of rating curve, about 34,200 second-feet); minimum stage recorded, 2.18 feet September 24–25, 1913 (discharge, 177 second-feet).

DIVERSIONS.—The Palermo Land & Water Co.'s canal and South Feather Land & Water Co.'s canal divert from South Fork of Feather River and tributaries.

REGULATION.—None

ACCURACY.—Stage-discharge relation changed February 25. Rating curves used before and after the change well defined below 14,000 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Middle Fork of Feather River near Oroville, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	Charles Leidl	2.51	317	July 17	J. F. Kunesh	3.40	631
Feb. 15	J. F. Kunesh	3.54	827	Sept. 29	do	2.25	219
Apr. 20	do	6.70	3,740				

Daily discharge, in second-feet, of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	305	330	585	730	785	5,640	4,650	6,730	5,130	1,220	380	230
2	425	318	1,440	785	730	4,810	4,330	6,180	5,130	1,150	380	230
3	490	318	2,240	960	730	4,030	4,180	5,820	4,970	1,080	380	230
4	442	330	8,480	785	680	3,450	4,180	6,180	4,810	1,080	380	230
5	390	840	3,310	785	680	3,050	4,650	6,360	4,490	1,010	345	230
6	390	680	3,590	1,080	730	3,050	5,470	6,360	4,490	950	345	230
7	680	585	2,140	900	785	2,920	5,640	7,110	4,490	950	345	230
8	540	480	1,760	785	785	2,920	7,110	6,730	4,650	890	345	230
9	460	425	1,440	730	730	3,050	6,000	7,490	4,970	830	330	230
10	425	425	1,290	680	785	2,560	5,300	7,300	5,130	830	315	230
11	425	425	1,150	655	785	2,340	5,820	7,300	4,180	775	315	230
12	425	408	1,020	630	785	2,120	11,300	6,920	3,590	775	315	230
13	390	390	960	630	785	2,120	8,280	7,300	3,310	725	315	230
14	375	360	900	630	785	2,120	7,300	7,880	3,310	675	315	230
15	360	330	840	608	730	1,920	6,180	7,300	3,310	675	300	210
16	360	330	840	585	785	1,720	5,300	5,820	3,310	675	285	210
17	360	330	785	608	960	1,720	4,650	5,640	3,180	630	285	210
18	345	330	730	608	840	1,720	4,180	5,470	3,050	630	285	210
19	330	360	730	680	900	1,720	3,880	4,810	2,800	585	255	210
20	330	360	730	630	1,080	1,820	3,730	4,490	2,680	562	255	210
21	330	360	730	630	2,040	2,020	3,730	4,490	2,560	540	255	210
22	330	360	730	630	4,970	2,120	7,680	4,490	2,230	540	255	210
23	330	360	840	562	2,800	2,020	11,500	4,650	2,020	495	255	230
24	330	360	1,600	562	10,400	2,120	10,900	4,810	1,820	475	255	230
25	330	360	900	562	20,400	2,230	10,900	5,300	1,720	455	255	230
26	330	2,450	840	562	10,900	2,560	10,900	4,330	1,630	435	270	230
27	330	1,150	785	562	8,890	2,800	9,980	4,330	1,540	415	285	230
28	330	840	785	585	7,110	4,180	9,100	4,490	1,380	415	255	220
29	330	730	730	730	.....	5,470	7,680	4,970	1,380	415	255	210
30	330	630	680	1,150	.....	7,680	7,110	4,490	1,300	415	255	220
31	330	.....	730	900	.....	5,470	.....	5,300	.....	398	242	.....

Monthly discharge of Middle Fork of Feather River near Oroville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	680	305	383	23,600
November	2,450	318	532	31,700
December	8,480	585	1,430	87,900
January	1,150	562	707	43,500
February	20,400	680	2,980	166,000
March	7,680	1,720	3,020	186,000
April	11,500	3,730	6,720	400,000
May	7,880	4,330	5,830	358,000
June	5,130	1,300	3,290	196,000
July	1,220	398	700	43,000
August	380	242	300	18,400
September	230	210	223	13,300
The year	20,400	210	2,160	1,570,000

SOUTH FORK OF FEATHER RIVER AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., about 800 feet above mouth of Powell Creek and half a mile above highway bridge, at Enterprise, Butte County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1917.

GAGE.—Inclined staff bolted to ledge on right bank; read by Gus Alm. Original gage, which was read until November 8, 1913, consisted of two vertical sections on left bank, 150 feet below present site. Original datum maintained.

DISCHARGE MEASUREMENTS.—Made from cable, 90 feet below gage, or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—1911–1917: Maximum stage recorded, 12.05 feet at 9.55 a. m. February 25, 1917 (discharge, from extension of rating curve, about 10,600 second-feet); minimum stage recorded, 2.45 feet at 7.20 a. m. August 11 (discharge, 0.2 second-foot).

DIVERSIONS.—The diversion dam of the Palermo Land & Water Co.'s canal is 1 mile above the station. The South Feather Land & Water Co.'s canal diverts from Lost and Pinkard creeks, above the station. This water is used for irrigation in the vicinity of Wyandotte and Bangor.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 25. Rating curves fairly well defined below 800 second-feet and extended above; coincide above 570 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records good except those for extremely high water, which are fair.

Discharge measurements of South Fork of Feather River at Enterprise, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	Charles Leidl	3.23	31	June 1	J. F. Kunesh	5.05	706
Feb. 15	J. F. Kunesh	3.83	135	July 17	.....do	3.05	32
15	.....do	3.83	133	Sept. 29	.....do	2.57	1.2
Apr. 20	.....do	4.90	636				

Daily discharge, in second-feet, of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10	22	67	141	169	965	600	965	722	80	5	0.5
2	94	22	353	154	128	690	515	965	722	80	3.2	.5
3	67	27	401	184	154	690	488	890	630	63	1.5	.5
4	52	27	1,280	169	154	630	515	890	630	63	.5	.5
5	39	67	630	220	154	542	570	890	630	63	.5	.5
6	67	84	570	307	154	515	630	890	570	63	.5	.5
7	128	67	401	184	154	462	690	965	570	49	.5	.5
8	67	52	307	169	141	415	890	1,040	570	49	.5	.5
9	60	52	262	154	141	415	1,040	1,120	630	49	.5	.5
10	60	39	241	154	141	415	1,120	1,120	570	49	.5	.5
11	46	27	184	141	141	394	1,840	1,200	462	49	.2	.5
12	52	27	169	128	154	372	2,050	965	415	38	.5	.5
13	46	27	154	128	154	352	1,370	1,040	394	38	.5	.5
14	46	27	154	128	154	332	1,120	1,040	332	49	.5	.5
15	46	27	154	116	154	332	965	890	332	38	.5	.5
16	39	27	141	116	141	332	890	890	372	27	.5	.5
17	39	16	128	128	169	332	690	890	352	27	.5	.5
18	39	16	128	128	169	332	690	820	352	27	.5	.5
19	33	27	128	128	169	332	630	755	314	27	.5	.5
20	33	27	128	128	202	352	630	660	295	18	.5	.5
21	33	33	128	116	1,280	352	630	660	278	14	.5	.5
22	27	33	128	116	1,040	332	2,050	690	227	10	.5	.5
23	27	39	184	105	690	314	2,270	722	196	10	.5	.5
24	27	39	184	105	4,380	295	2,050	722	182	10	.5	.5
25	27	39	184	105	10,500	332	1,940	1,280	167	10	.5	.5
26	27	307	154	105	2,620	372	1,740	690	142	10	1.0	.5
27	27	141	154	105	1,640	372	1,550	630	131	7.5	1.0	.5
28	27	105	154	105	1,280	462	1,460	630	110	5	1.0	.5
29	27	84	141	184	.....	570	1,200	722	99	5	1.0	.5
30	27	67	141	262	.....	755	1,120	722	80	5	.5	1.5
31	27	.....	141	184	.....	630	.....	722	.....	5	.5	.....

Monthly discharge of South Fork of Feather River at Enterprise, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	128	10	44.1	2,710
November	307	16	53.1	3,160
December	1,280	67	248	15,200
January	307	105	148	9,100
February	10,500	128	947	52,600
March	965	295	451	27,700
April	2,270	488	1,130	67,200
May	1,280	630	873	53,700
June	722	80	383	22,800
July	80	5	33.5	2,060
August	5	.2	.82	50.4
September	1.5	.5	.53	31.5
The year	10,500	.2	354	256,000

PALERMO LAND & WATER CO.'S CANAL AT ENTERPRISE, CALIF.

LOCATION.—In NE. ¼ sec. 1, T. 19 N., R. 6 E., 1,000 feet above Alm's residence at Enterprise, Butte County, and three-fourths mile below intake at diversion dam on South Fork of Feather River.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1917.

GAGE.—Vertical staff on right wall of concrete approach to sheet-iron flume; read by Gus Alm. Original gage, which was read up to March 31, 1914, and also from March 15 to April 13, 1915, during rebuilding of flume just above it, was vertical staff fastened to post on right bank about one-fourth of a mile below. Datum of this gage was lowered 1.00 foot November 9, 1913. From April 1, 1914, to March 14, 1915, readings were taken from a gage installed March 22, 1914, in the flume, about 800 feet above old gage. Present gage was installed April 13, 1915. Readings on it began April 14. The relations between the three gages used have not been determined.

DISCHARGE MEASUREMENTS.—Made from foot-plank at gage.

CHANNEL AND CONTROL.—Composed of concrete. Control is throat of approach to metal flume. Control at original station is a length of the channel which is composed of gravel and sand. The control for the gage which was in the old wooden flume was also a length of channel.

EXTREMES OF DISCHARGE.—1911–1917: Maximum discharge recorded, 40 second-feet July 24, 1914; no flow during periods of nearly every year.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records excellent.

Canal furnishes water for irrigation below Oroville.

Discharge measurements of Palermo Land & Water Co.'s canal at Enterprise, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	Charles Leidl	1.44	15.2	June 1	J. F. Kunesh	2.20	34
Feb. 15	J. F. Kunesh	1.86	26	July 17	do	2.34	39
15	do	1.75	23	Sept. 29	do	1.88	26
Apr. 20	do	1.57	17.9				

Daily discharge, in second-feet, of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	32	21	14.2	9.5	15.0	26	16.4	28	35	39	39	28
2	25	21	15.2	8.3	13.4	26	16.4	28	35	39	39	28
3	21	16.6	8.3	9.0	15.2	26	16.4	28	38	39	39	28
4	21	16.6	4.4	9.0	13.0	26	16.4	28	37	39	38	28
5	21	17.0	9.6	9.0	16.2	25	14.0	28	37	39	38	28
6	22	16.8	9.6	9.2	16.4	26	19.2	31	37	40	38	27
7	17.2	16.6	9.5	9.2	16.4	25	9.2	33	37	40	37	27
8	16.8	16.6	9.5	7.7	26	25	19.0	32	37	39	36	27
9	16.4	16.6	9.5	7.5	26	16.4	19.0	35	37	39	36	27
10	16.4	16.6	9.2	7.5	26	16.0	19.0	36	37	39	35	27
11	16.4	16.4	9.2	7.6	25	16.4	9.7	36	36	39	34	28
12	16.4	14.2	9.2	9.2	23	14.8	13.2	36	37	39	34	27
13	16.4	14.2	9.2	6.0	26	16.0	13.2	36	37	39	34	27
14	16.0	14.2	9.2	.0	24	16.4	12.8	36	37	39	34	27
15	16.0	14.2	9.2	.0	24	16.4	12.8	17.6	37	39	33	26
16	16.2	14.2	9.2	.0	25	16.8	12.5	33	37	39	33	26
17	16.4	14.2	9.2	.0	27	16.8	12.5	30	38	38	33	25
18	16.4	14.0	9.2	.0	27	16.0	12.5	30	38	38	32	25
19	16.0	14.2	9.2	.0	24	16.0	8.3	30	38	39	32	24
20	16.0	14.2	9.0	.0	15.2	.0	18.7	30	38	38	32	24
21	16.0	14.2	9.0	.0	6.5	.0	18.5	30	39	38	31	24
22	16.4	14.2	9.2	.0	11.8	16.4	16.7	33	38	39	31	25
23	16.4	14.2	9.2	.0	11.8	24	17.0	34	38	40	31	32
24	16.4	14.2	9.5	3.6	4.8	16.2	21	35	38	39	30	31
25	16.4	14.2	9.5	6.5	.5	16.2	21	35	39	39	31	29
26	16.4	15.2	9.5	12.8	.5	14.4	24	34	39	39	31	27
27	16.4	14.4	9.5	16.4	.3	14.4	25	34	38	38	30	27
28	16.4	14.2	9.5	16.4	8.6	14.4	27	34	39	38	28	27
29	16.4	14.2	9.5	16.4	.....	16.4	28	34	39	38	29	21
30	16.4	14.2	9.5	16.4	.....	16.8	28	30	39	39	29	26
31	21	.....	9.5	14.0	.....	16.6	.....	33	.....	39	28	.....

Monthly discharge of Palermo Land & Water Co.'s canal at Enterprise, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	32	16.0	17.9	1,100
November	21	14.0	15.4	916
December	15.2	4.4	9.49	584
January	16.4	.0	6.81	419
February	27	.3	16.7	928
March	26	.0	17.7	1,090
April	28	8.3	17.2	1,020
May	36	17.6	31.9	1,960
June	39	35	37.5	2,230
July	40	38	38.9	2,390
August	39	28	33.4	2,050
September	32	24	26.9	1,600
The year	40	.0	22.4	16,300

MIDDLE FORK OF YUBA RIVER[1] NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., below highway bridge at Freeman's Crossing, in Tahoe National Forest, 1¼ miles northeast of North San Juan, Nevada County. Moonshine Creek enters one-fourth of a mile below, Oregon Creek three-fourths of a mile above, and North Fork of Yuba River about 4 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 27, 1910, to September 30, 1917.

GAGE.—Vertical staff wedged between two large boulders on right bank one-fourth of a mile below bridge; read by Henry Zurhorst.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet above gage, or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.9 feet at 6 p. m. April 22 (discharge, 3,740 second-feet); minimum stage recorded, 4.42 feet September 4–9, 13–22 and 28–30 (discharge, 46 second-feet).

1910–1917: Maximum stage recorded, 11.7 feet at 10 a. m. May 12, 1915 (discharge, 14,300 second-feet); minimum stage recorded, 4.30 feet September 23–27, 1914 (discharge, 35 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation has not changed since May 13, 1915. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 8	4.69	96	Feb. 17	5.30	329
8	4.69	97	July 21	4.72	107
Feb. 17	5.30	330			

[1] Known locally as Middle Yuba River.

Daily discharge, in second-feet, of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	78	62	108	136	282	840	722	1,360	1,540	340	78	50
2	102	62	391	169	238	685	685	1,240	1,610	355	78	50
3	102	68	563	206	238	582	615	1,130	1,610	340	78	50
4	83	68	2,270	191	230	146	650	1,360	1,480	330	74	46
5	78	136	840	191	238	130	760	1,420	1,240	306	74	46
6	74	136	760	282	256	124	930	1,480	1,480	292	68	46
7	136	146	408	206	273	116	1,130	1,760	1,610	273	62	46
8	108	102	330	198	273	108	1,760	1,610	1,610	260	62	46
9	90	90	282	169	260	124	1,240	1,920	1,920	238	62	46
10	83	90	247	162	260	116	1,130	2,090	1,920	218	62	50
11	83	90	247	162	247	408	1,360	2,090	1,360	198	58	50
12	83	83	198	162	247	391	2,660	1,680	1,080	191	58	50
13	78	78	191	162	238	391	1,680	1,920	1,030	180	58	46
14	74	74	180	162	238	380	1,360	2,270	1,130	169	58	46
15	74	78	162	146	238	340	1,130	2,090	1,130	169	58	46
16	78	74	156	124	238	355	930	1,300	1,240	162	58	46
17	74	78	156	156	330	370	760	1,360	1,240	156	58	46
18	68	78	146	218	273	380	685	1,030	1,130	136	58	46
19	68	78	146	156	282	408	615	930	1,030	130	58	46
20	68	78	136	162	320	435	615	840	1,030	124	58	46
21	74	74	136	130	1,360	490	685	930	930	108	58	46
22	68	74	146	130	2,090	435	3,520	930	800	102	58	46
23	62	74	162	130	840	424	3,300	1,080	685	102	55	55
24	62	74	330	130	4,180	435	2,870	1,030	615	102	55	55
25	58	74	230	124	6,510	490	2,870	1,030	550	97	58	55
26	58	462	169	130	2,760	490	2,870	840	550	97	55	55
27	62	198	156	136	1,610	550	2,660	930	490	90	55	50
28	62	156	156	156	1,130	685	2,270	1,180	462	83	55	46
29	62	136	136	490	.....	930	1,610	1,420	435	78	58	46
30	62	124	130	615	.....	1,240	1,540	1,540	380	78	55	46
31	62	.....	130	380	.....	930	.....	1,610	.....	78	50	.....

NOTE.—No gage-height record Jan. 11 and Feb. 6; discharge interpolated.

Monthly discharge of Middle Fork of Yuba River near North San Juan, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	136	58	76.6	4,710
November	462	62	106	6,310
December	2,270	108	316	19,400
January	615	124	196	12,100
February	6,610	230	921	51,200
March	1,240	108	449	27,600
April	3,520	615	1,520	90,400
May	2,270	840	1,400	86,100
June	1,920	380	1,110	66,000
July	355	78	180	11,100
August	78	50	61.0	3,750
September	55	46	48.1	2,860
The year	6,610	46	527	382,000

YUBA RIVER AT SMARTSVILLE, CALIF.

LOCATION.—In sec. 22, T. 16 N., R. 6 E., at Narrows, 1 mile north of Smartsville, Yuba County, 1 mile below mouth of Deer Creek, 6½ miles below mouth of South Fork, 7 miles above mouth of Dry Creek, and 18 miles above the junction with Feather River.

DRAINAGE AREA.—1,220 square miles.

RECORDS AVAILABLE.—June 2, 1903, to September 30, 1917.

GAGE.—Staff in three sections, bolted to solid rock on left bank, read by Joseph French. On account of the gradual erosion of the channel the gage datum was lowered 10 feet on August 1, 1906. Before the change, first section was vertical, and driven into gravel near left bank 50 feet below cable; second section was painted on rock ledge on left bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. As the result of extensive mining in the early days, the channel has been filled with an enormous quantity of tailings. At the station, the depth of mining débris is estimated to be more than 80 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.0 feet at 8.15 a. m. February 25 (discharge, 45,800 second-feet); minimum stage recorded, 1.95 feet at 4.25 p. m. September 20 (discharge, 226 second-feet).

1903–1917: Maximum stage recorded, 28.3 feet January 15, 1909 (discharge, 111,000 second-feet); minimum stage recorded, 3.23 feet October 5, 1913 (discharge, 216 second-feet); Bed of stream is being eroded so that stage becomes lower each year.

DIVERSIONS.—Water is diverted for power and irrigation above the station. See next paragraph.

REGULATION.—Small lakes near the headwaters of the South Fork of Yuba are utilized as storage reservoirs. A part of this water is diverted into the Bear River drainage basin.

ACCURACY.—Stage-discharge relation changed during high water of February 25, April 12, and June 4. Curves used from October 1 to February 25 and from June 5 to September 30 are well defined; curves used between February 26 and June 4 are fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records from February 25 to June 4 are fair; those for other periods are excellent.

Discharge measurements of Yuba River at Smartsville, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 2	2.34	376	Mar. 8	5.96	3,220	July 18	3.13	807
2	2.34	371	Apr. 19	5.94	3,910			
Feb. 25	16.7	40,000	May 31	7.92	7,770			

Daily discharge, in second-feet, of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	360	360	770	1,460	1,680	6,790	4,700	6,820	8,900	2,280	417	242
2	560	360	3,110	1,570	1,570	5,480	3,970	6,200	9,160	2,150	396	276
3	587	360	6,890	2,680	1,520	4,700	3,790	6,200	9,420	2,030	396	276
4	532	416	19,300	1,680	1,460	4,150	3,620	6,600	9,420	1,910	396	276
5	436	878	5,090	2,540	1,460	3,790	4,150	7,040	7,960	1,790	396	259
6	616	915	4,550	2,280	1,570	3,620	4,890	7,480	8,400	1,790	375	294
7	878	955	3,720	1,790	1,520	3,450	5,480	7,940	8,880	1,680	354	276
8	675	616	2,410	1,680	1,570	3,280	7,500	7,700	9,120	1,570	354	276
9	587	532	2,030	1,520	1,680	3,620	8,240	8,420	9,900	1,520	334	259
10	532	507	1,680	1,320	1,570	3,120	8,240	8,180	9,380	1,320	313	242
11	532	532	1,570	1,260	1,520	2,960	9,580	9,420	8,880	1,170	294	294
12	507	507	1,460	1,220	1,570	2,960	15,400	8,900	6,260	1,040	276	313
13	532	436	1,420	1,170	1,460	3,790	8,420	10,500	5,860	955	313	276
14	532	436	1,260	1,120	1,520	3,120	7,700	14,500	6,260	840	313	259
15	532	436	1,220	1,080	1,420	2,960	7,040	10,500	6,680	805	276	242
16	507	459	1,170	1,040	1,680	2,650	5,420	7,700	6,890	840	276	242
17	482	482	1,080	955	2,540	2,650	5,050	7,940	7,100	770	276	226
18	459	459	1,040	995	1,790	2,500	4,170	6,400	6,680	805	259	242
19	436	436	1,080	1,040	2,280	2,650	4,000	5,420	7,310	705	276	242
20	436	436	995	995	4,730	2,650	3,680	4,870	5,860	645	276	226
21	436	436	1,040	955	12,200	2,800	4,000	5,050	5,660	560	276	242
22	416	416	1,170	915	16,900	2,960	12,700	5,420	5,090	560	276	294
23	396	416	1,460	955	10,400	2,650	16,600	6,000	4,550	532	259	334
24	396	396	3,880	995	23,800	2,650	12,700	6,600	4,040	532	242	294
25	396	459	3,260	955	38,800	2,650	12,700	6,200	4,040	560	276	276
26	396	3,410	1,790	1,040	23,200	2,960	12,500	4,510	3,410	532	313	276
27	396	1,570	1,260	995	12,200	3,280	10,800	4,690	3,110	507	354	259
28	396	995	1,420	1,040	8,760	4,330	10,200	6,200	2,820	482	294	242
29	396	840	1,260	2,680	.....	5,280	7,940	7,700	2,680	460	276	242
30	396	645	1,220	3,880	.....	7,020	7,480	7,480	2,410	438	259	276
31	378	.....	1,360	3,110	.....	5,080	.....	7,700	.....	438	242	.....

Monthly discharge of Yuba River at Smartsville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	878	360	488	30,000
November	3,410	360	670	39,900
December	19,300	770	2,610	160,000
January	3,880	915	1,510	92,800
February	38,800	1,420	6,510	362,000
March	7,020	2,500	3,630	223,000
April	16,600	3,620	7,760	462,000
May	14,500	4,510	7,300	449,000
June	9,900	2,410	6,540	389,000
July	2,280	438	1,040	63,900
August	417	242	311	19,100
September	334	226	266	15,800
The year	38,800	226	3,190	2,310,000

OREGON CREEK NEAR NORTH SAN JUAN, CALIF.

LOCATION.—In N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., below highway bridge, in Tahoe National Forest, 500 feet above junction with Middle Fork of Yuba River, half a mile above Freemans Crossing, Yuba County, and 2 miles northeast of North San Juan, Nevada County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1917.

GAGE.—Vertical staff fastened to an alder tree on right bank, 150 feet below bridge; read by H. Zurhorst.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 10 a. m. February 25 (discharge, 1,780 second-feet); minimum discharge, 3.2 second-feet, September 30.

1910–1917: Maximum stage recorded, 8.5 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 4,080 second-feet); minimum discharge, 2 second-feet, September 13–20, 1913.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 25; the driving of wagons across control caused changes after July 21. Raitng curve used October 1 to February 25 well defined below 100 second-feet and poorly defined above; curve used February 26 to July 20 fairly well defined below 100 second-feet and poorly defined above. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used July 21 to September 30. Records fair.

Discharge measurements of Oregon Creek near North San Juan, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 8	4.08	13	Feb. 17	4.66	87
8	4.08	12	July 21	3.71	6.2
Feb. 17	4.65	86			

Daily discharge, in second-feet, of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8	8	17	32	79	235	195	203	51	10	5.5	4.5
2	20	8	86	38	68	195	175	187	48	10	5.5	4.3
3	14	8	175	51	65	155	155	155	44	10	5.5	4.3
4	8.5	8	445	41	62	138	155	155	41	9.5	5.5	4.3
5	8	26	227	41	65	122	195	155	41	9.5	5.5	4.3
6	7.5	26	195	72	66	116	227	148	38	9.5	5.5	4.2
7	24	26	94	51	68	108	244	148	36	9	5.5	4.2
8	15	14	76	48	68	108	385	148	28	9	5.5	4.2
9	10	12	65	41	68	116	415	148	26	8.5	5.5	4.0
10	8.5	10	54	38	68	108	510	138	26	8.5	5.5	4.0
11	8.5	10	48	38	68	91	548	129	26	8.5	5	4.0
12	8	10	41	38	68	82	750	122	24	8.5	5	4.0
13	8	8.5	38	38	65	82	445	122	19	8.5	5	3.9
14	8	8.5	38	41	65	82	385	116	17	8	5	3.6
15	7.5	8.5	36	41	65	79	280	100	17	7.5	5	3.6
16	7.5	8.5	32	38	65	79	244	86	16	7.5	4.7	3.5
17	7.5	8.5	28	48	86	76	195	91	16	7.5	4.7	3.5
18	7.5	8.5	26	41	72	79	175	82	16	7.5	5	3.5
19	7.5	8	26	38	79	91	155	79	15	7.5	4.9	3.5
20	7.5	8	26	51	82	82	148	76	13	7.5	4.9	3.3
21	7.5	8	26	41	478	94	148	68	13	7	4.9	3.3
22	7.5	8	26	38	665	94	750	65	12	6.5	4.9	3.3
23	7.5	8	28	32	290	91	708	65	12	6.5	4.5	3.5
24	7.8	8	76	28	1,520	94	510	65	12	7	4.5	3.5
25	7.5	8	44	26	1,780	100	415	62	12	6	4.5	3.5
26	7.5	155	38	28	750	116	358	62	11	6	4.3	3.5
27	7.5	44	36	36	445	122	358	58	11	6	4.3	3.3
28	7.5	38	32	36	320	175	320	54	10	6	4.6	3.3
29	7.5	26	28	235	.....	235	235	54	10	6	4.6	3.3
30	7.5	20	38	244	.....	341	215	51	10	6	4.5	3.2
31	8	.....	32	108	.....	235	.....	51	.....	6	4.5	.....

NOTE.—No gage-height record Jan. 11 and Feb. 6; discharge interpolated.

Monthly discharge of Oregon Creek near North San Juan, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	24	7.5	8.00	492
November	155	8	18.5	1,100
December	445	17	70.2	4,320
January	244	26	55.4	3,410
February	1,780	62	273	15,200
March	341	76	126	7,750
April	750	148	333	19,800
May	203	51	105	6,460
June	51	10	22.4	1,330
July	10	6	7.77	478
August	5.5	4.3	4.98	306
September	4.5	3.2	3.75	223
The year	1,780	3.2	84.1	60,900

NORTH FORK OF YUBA RIVER[1] AT GOODYEAR BAR, CALIF.

LOCATION.—In E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in Tahoe National Forest, at highway bridge at Goodyear Bar, Sierra County. Rock Creek and Goodyear Creek enter one-eighth and one-fourth mile, respectively, below station; North Fork of North Fork of Yuba River enters at Downieville, 4 miles above.

DRAINAGE AREA.—214 square miles.

RECORDS AVAILABLE.—October 31, 1910, to September 30, 1917.

GAGE.—Vertical staff in two sections on left bank; read by G. E. King. Low-water section is fastened to old piling under bridge; remainder of gage is bolted to left abutment of bridge.

[1] Known locally as North Yuba River.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Solid rock, small boulders, and gravel; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.3 feet in the morning of February 25, and June 8 (discharge, 3,940 second-feet); minimum discharge, 148 second-feet, November 2, 3, and 13.

1910–1917: Maximum stage recorded, 11.5 feet at 5.40 p. m. May 11, 1915 (discharge, 12,600 second-feet); minimum stage recorded, 3.3 feet October 1–4, 13–21, 1912 and September 16 to October 31, 1913 (discharge, 116 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation changed February 25. Rating curves fairly well defined below 1,000 second-feet and well defined between 1,000 and 5,000 second-feet. Gage read to half-tenths once daily. Record is somewhat broken (see footnote to daily-discharge table). Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 4	3.36	152	Nov. 5	3.50	197	Feb. 19	3.68	270
4	3.38	169	6	3.58	245	July 20	3.89	403

Daily discharge, in second-feet, of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	235	163	275	197	235	630	722	1,600	2,410	895	268	192
2	235	148	520	235	235	570	755	1,500	2,410	825	268	176
3	235	148	945	216	216	570	1,090	1,500	2,530	755	268	176
4	235	197	1,300	197	235	515	932	1,500	2,410	690	268	176
5	235	197	1,120	235	235	515	860	1,600	2,540	660	227	176
6	235	255	580	216	235	515	1,010	1,820	2,660	660	227	176
7	235	180	465	216	255	488	1,130	1,930	3,190	630	227	176
8	235	180	390	216	255	488	1,130	2,410	3,940	630	227	176
9	235	163	365	197	255	515	1,050	2,170	3,480	600	227	176
10	235	163	320	197	255	488	932	2,410	2,660	570	227	176
11	235	163	275	197	255	460	1,500	2,170	2,410	542	227	176
12	216	163	275	197	255	460	1,400	2,530	2,050	515	227	176
13	216	148	275	197	255	460	1,220	2,920	1,930	515	227	160
14	216	163	235	197	255	434	1,130	2,790	2,100	488	227	160
15	216	163	235	197	255	434	1,050	2,460	2,100	474	227	160
16	197	163	235	197	275	408	975	2,140	2,330	460	210	160
17	197	163	235	197	275	408	900	1,820	2,370	460	210	160
18	194	163	235	235	255	408	825	1,500	2,220	434	210	160
19	190	163	235	235	275	408	755	1,400	2,050	434	210	160
20	187	163	235	216	275	460	755	1,400	2,050	408	210	160
21	184	163	235	197	680	460	895	1,500	1,930	408	210	160
22	180	163	235	197	680	460	2,920	1,710	1,600	384	210	160
23	180	163	235	197	580	460	2,790	1,710	1,500	359	210	160
24	163	163	235	197	2,790	488	2,410	1,710	1,400	336	210	160
25	163	197	235	197	3,190	515	2,530	1,600	1,220	336	210	160
26	163	415	235	197	1,400	542	2,660	1,600	1,150	336	210	160
27	163	335	235	197	895	630	2,290	1,600	1,090	312	210	160
28	163	255	235	216	755	825	1,930	1,930	1,030	312	210	160
29	163	235	216	275	.....	1,130	1,710	2,170	970	290	210	160
30	163	216	216	320	.....	1,050	1,710	2,050	932	268	210	160
31	163	.....	235	255	.....	825	.....	2,660	.....	268	210	.....

NOTE.—No gage-height record Oct. 13–14, 18–21, Nov. 27, Apr. 16–18, May 15–17, June 26–28, 30, and July 15; discharge interpolated. No gage-height record June 14–19; discharge estimated by comparison with records of flow for Middle Fork of Yuba River.

Monthly discharge of North Fork of Yuba River at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	235	163	202	0.944	1.09	12,400
November	415	148	190	.888	.99	11,300
December	1,300	216	364	1.70	1.96	22,400
January	320	197	214	1.00	1.15	13,200
February	3,190	216	572	2.67	2.78	31,800
March	1,130	408	549	2.57	2.96	33,800
April	2,920	722	1,400	6.54	7.30	83,300
May	2,920	1,400	1,930	9.02	10.40	119,000
June	3,940	932	2,090	9.77	10.90	124,000
July	895	268	492	2.30	2.65	30,300
August	268	210	224	1.05	1.21	13,800
September	192	160	167	.780	.87	9,940
The year	3,940	148	697	3.26	44.26	505,000

NORTH FORK OF NORTH FORK OF YUBA RIVER[1] AT DOWNIEVILLE, CALIF.

LOCATION.—In NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., at upper highway bridge in Downieville, Sierra County, 500 feet above dam and one-fourth mile above junction with North Fork of Yuba River. East Fork of North Fork enters one-eighth mile above and Middle Fork of North Fork 1¼ miles above station.

DRAINAGE AREA.—71.2 square miles.

RECORDS AVAILABLE.—November 1, 1910, to September 30, 1917.

GAGE.—Vertical staff fastened to right abutment of bridge; read by J. T. Mason.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders. Since flood of May 11, 1915, control is the dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet at 9 p. m. February 24 (discharge, 4,330 second-feet); minimum stage recorded, 2.4 feet October 15 to November 3 and November 10–16 (discharge, 59 second-feet).

1911–1917: Maximum stage recorded, 8.0 feet at 5 p. m. May 11, 1915 (discharge from extension of rating curve, about 6,760 second-feet); minimum stage recorded, 2.55 feet October 14–18, 1912 (discharge, 36 second-feet).

ICE.—Stage-discharge relation slightly affected by ice for short periods in severe winters.

DIVERSIONS.—The intake of the municipal water system of Downieville is above the station.

REGULATION.—*See* Accuracy.

ACCURACY.—Stage-discharge relation is dependent on the presence and height of flash boards on the dam and on the operation of the power plant which takes its water between the gage and dam. Observer has been instructed to read the gage when plant is not running; it is usually shut down between about 7.30 a. m. and 4.30 p. m. Stage-discharge relation was slightly affected by ice January 18–21. Rating curve for no boards on dam, well defined below 2,000 second-feet and is an extension above; curves for 12-inch boards on dam, well defined; for 18-inch boards on dam, fairly well defined. Gage read to half-tenths, sometimes hundredths, twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by John T. Mason.

[1] Known locally as North Fork of North Yuba River.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 3	2.41	60	Nov. 6	2.66	101	Feb. 18	2.84	106
3	2.41	60	Feb. 18	2.84	107	July 20	2.67	139
4	2.58	84						

Daily discharge, in second-feet, of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	110	59	79	60	86	290	364	775	985	364	120	60
2	74	59	156	60	79	265	364	738	1,030	364	108	60
3	71	59	270	60	79	230	364	700	1,030	310	108	60
4	71	70	580	60	79	220	364	738	1,030	310	108	60
5	65	88	410	60	92	220	375	775	1,030	310	101	60
6	74	76	220	60	102	220	485	898	1,030	285	98	60
7	71	71	130	60	92	220	590	985	1,080	260	96	60
8	69	65	124	60	102	215	700	1,080	1,320	260	96	60
9	69	65	79	60	98	211	555	1,080	1,430	252	96	60
10	71	59	79	60	98	211	485	1,220	1,120	252	96	60
11	71	59	79	60	98	199	662	1,080	940	226	96	60
12	71	59	79	60	98	180	775	985	775	210	96	60
13	65	59	79	60	98	180	625	1,380	775	199	96	60
14	65	59	79	60	98	180	555	1,120	855	199	96	60
15	59	59	79	60	98	180	520	940	985	199	96	60
16	59	60	79	60	98	164	454	940	940	180	96	60
17	59	60	79	60	98	147	423	855	855	180	96	60
18	59	60	79	60	110	147	364	700	855	173	68	60
19	59	60	79	60	110	164	364	625	855	154	62	60
20	59	60	79	60	124	164	364	590	775	142	60	60
21	59	60	68	60	212	173	364	625	662	131	60	60
22	59	60	68	60	212	164	1,900	700	625	131	60	60
23	59	60	68	60	162	164	1,780	775	520	120	60	60
24	59	60	79	60	1,850	173	1,540	775	555	120	60	60
25	59	60	79	60	1,550	188	1,540	700	520	120	60	60
26	59	130	79	60	560	239	1,540	625	454	120	60	60
27	59	130	79	60	460	285	1,270	662	435	120	60	60
28	59	102	60	60	290	423	1,120	775	423	120	60	60
29	59	60	60	90	.....	625	940	898	423	120	60	60
30	59	79	60	102	.....	541	855	940	394	120	60	60
31	59	.....	60	75	.....	435	.....	940	.....	120	60	.....

NOTE.—12-inch flash boards on dam Oct. 1 to Nov. 16; 18-inch flash boards on dam Nov. 16 to Feb. 2 and Aug. 18 to Sept. 30; combination of 12-inch and 18-inch flash boards on dam Mar. 8 to Aug. 17; no flash boards on dam Feb. 24 to Mar. 8; waste gate in head race open Jan. 31 to July 29.

Monthly discharge of North Fork of North Fork of Yuba River at Downieville, Calif., for the year ending Sept. 30, 1917.

[Drainage area, 71.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	110	59	65.2	0.916	1.06	4,010
November	130	59	68.9	.968	1.08	4,100
December	580	60	119	1.67	1.93	7,320
January	102	60	62.8	.882	1.02	3,860
February	1,850	79	258	3.62	3.77	14,300
March	625	147	239	3.36	3.87	14,700
April	1,900	364	753	10.6	11.83	44,800
May	1,380	590	859	12.10	13.95	52,800
June	1,430	394	824	11.6	12.94	49,000
July	364	120	199	2.79	3.22	12,200
August	120	60	82.2	1.16	1.34	5,050
September	60	60	60.0	.843	.94	3,570
The year	1,900	59	298	4.19	56.96	216,000

ROCK CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at footbridge at Goodyear Bar, Sierra County, in Tahoe National Forest, Woodruff Creek enters 350 feet above and Rock Creek joins North Fork of Yuba River 600 feet below station.

DRAINAGE AREA.—10.8 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1917.

GAGE.—Vertical staff fastened to an alder tree on right bank 40 feet below bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Rough; boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.9 feet February 25 (discharge, 549 second-feet); minimum stage recorded, 0.95 foot July 18, 19, 23 and 24 (discharge, 0.3 second-foot).

1910–1917: Maximum stage recorded, 7.0 feet at 3.30 p. m. December 31, 1913 (roughly approximate discharge, from extension of rating curve, 820 second-feet); minimum stage recorded, 0.95 foot July 18, 19, 23 and 24, 1917 (discharge, 0.3 second-foot).

DIVERSIONS.—Three small ditches having a total capacity of about 10 second-feet head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low stages changed slightly, probably by the high water February 25. Rating curves used before and after change well defined; identical above 12 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Rock Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 4	1.14	2.4	Nov. 6	1.54	10.3	Feb. 19	1.60	13
4	1.13	2.3	Feb. 19	1.60	12	July 20	1.21	2.9
5	1.31	5.1						

Daily discharge, in second-feet, of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.2	2.6	12	6	12	206	54	94	63	4.1	1.1	0.4
2	4.9	2.6	54	7	11	54	58	94	63	4.1	1.1	.8
3	4.9	2.6	197	6	9.5	50	56	94	58	4.1	1.1	1.1
4	4.9	7	94	6	9.5	46	63	94	54	3.4	.4	1.1
5	4.9	4.9	119	8	9.5	46	73	94	50	3.4	.4	1.1
6	4.9	12	46	7	11	46	88	94	46	2.6	.4	1.1
7	4.9	4.0	30	7	12	42	100	94	46	2.6	.4	1.1
8	3.2	4.0	20	7	12	38	94	112	38	2.6	1.1	1.1
9	3.2	3.2	17	6	12	42	83	112	38	3.4	.4	1.1
10	3.2	3.2	12	6	12	38	73	119	38	3.4	1.1	1.1
11	2.6	3.2	12	6	12	34	255	106	30	2.6	1.1	1.1
12	2.6	2.6	12	6	12	34	180	112	23	1.1	1.1	1.1
13	2.3	2.6	11	6	12	34	140	119	23	1.1	1.1	1.1
14	2.1	2.6	9.5	6	12	30	119	106	21	1.1	1.1	1.1
15	1.9	2.6	9.5	6	12	30	106	97	20	1.8	1.1	1.1
16	1.9	2.6	9.5	6	12	26	95	89	18	2.6	1.1	1.1
17	1.9	2.6	8	6	12	26	84	81	17	1.1	1.1	1.1
18	1.9	2.6	7	6	12	26	73	73	15	.3	1.1	1.1
19	1.9	2.6	7	6	12	26	63	63	14	.3	1.1	1.1
20	1.9	2.6	7	7	12	30	63	68	12	2.6	1.1	1.1
21	1.9	1.9	7	4.9	119	30	78	63	12	2.6	1.1	1.1
22	1.9	1.9	7	4.9	106	30	235	63	12	1.1	1.1	1.1
23	1.9	1.9	6	4.9	83	30	215	68	11	.3	1.1	1.1
24	1.9	1.9	7	4.9	501	30	180	63	9	.3	1.1	1.1
25	1.9	2.6	7	4.9	454	34	197	68	9	1.1	1.1	1.1
26	1.9	17	7	4.9	147	38	180	63	8	.8	1.1	1.1
27	1.9	12	7	4.9	106	50	163	63	7	.8	1.1	1.1
28	1.9	8	7	7	83	73	147	83	6.5	.4	1.1	1.1
29	1.9	4.9	6	20	.....	119	119	73	6	.4	1.1	1.1
30	1.9	4.0	6	30	.....	94	106	63	5	1.1	1.1	1.1
31	2.6	.....	7	17	.....	63	.....	63	.....	1.1	1.1	.....

NOTE.—No gage-height record Oct. 13, 14, 18–21, Nov. 27, Apr. 16–18, May 15–17, June 5, 14–19, 26–28, 30, and July 15; discharge interpolated.

Monthly discharge of Rock Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	4.9	1.9	2.74	168
November	17	1.9	4.29	255
December	197	6	24.8	1,520
January	30	4.9	7.59	467
February	501	9.5	65.3	3,630
March	206	26	48.2	2,960
April	255	54	118	7,020
May	119	63	85.4	5,250
June	63	5	25.8	1,540
July	4.1	.3	1.88	116
August	1.1	.4	.99	61
September	1.1	.4	1.07	64
The year	501	.3	31.8	23,100

GOODYEAR CREEK AT GOODYEAR BAR, CALIF.

LOCATION.—In W.½ SW.¼ sec. 5, T. 19 N., R. 10 E., at trail bridge, in Tahoe National Forest, 300 feet above junction with North Fork of Yuba River and half a mile north of Goodyear Bar, Sierra County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1917.

GAGE.—Vertical staff fastened to alder tree on left bank 200 feet above bridge; read by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet February 24 (discharge, 543 second-feet); minimum stage recorded, 1.35 feet September 27–30 (discharge, 3.0 second-feet).

1910–1917: Maximum stage recorded, 7.0 feet at 3 p. m. December 31, 1913 (discharge, from extension of rating curve, about 1,460 second-feet); minimum stage recorded, 1.25 feet from August 14 to October 8, 1914 (discharge, 2 second-feet).

DIVERSIONS.—Three small irrigation ditches having a total capacity of about 7½ second-feet head above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 24. Rating curve before change well defined between 25 and 200 second-feet; fairly well defined below; and extended above; curve after change well defined between 2 and 200 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Goodyear Creek at Goodyear Bar, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 4	1.38	7.8	Nov 6	1.65	15	July 20	1.50	7.3
4	1.39	7.9	Feb. 19	1.82	27			
5	1.51	9.7	19	1.80	26			

Daily discharge, in second-feet, of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.5	5.5	26	12	26	106	100	144	94	19	8	4
2	7.5	6.5	52	14	23	94	106	138	94	19	8	4
3	7.5	6.5	158	14	20	83	106	131	83	19	8	4
4	7.5	12	131	14	23	83	112	131	83	19	8	4
5	7.5	10	144	23	26	83	131	144	78	19	6	4
6	9	20	83	20	26	83	144	165	72	16	4	4
7	10	9	52	17	26	72	165	165	72	12	4	4
8	9	9	38	17	26	72	172	187	72	12	4	4
9	7.5	9	30	14	26	78	138	165	67	12	8	4
10	7.5	9	26	14	26	72	124	172	62	12	4	4
11	7.5	9	26	14	26	67	257	158	57	10	4	4
12	6.5	7.5	26	14	26	67	203	172	48	10	4	4
13	6	7.5	23	14	26	67	172	172	48	8	4	4
14	6	7.5	20	14	26	62	158	158	45	6	4	4
15	5.5	7.5	20	14	26	62	131	158	43	8	4	4
16	5.5	7.5	20	14	30	62	123	145	40	8	4	4
17	5.5	6.5	20	14	30	62	115	131	38	8	4	4
18	5.5	6.5	17	14	26	62	107	118	35	6	4	4
19	5.5	6.5	14	14	26	62	100	105	32	8	4	4
20	5.5	6.5	14	12	26	67	100	94	30	8	4	4
21	5.5	6.5	14	14	138	67	112	112	26	8	4	4
22	5.5	6.5	17	14	106	67	424	106	26	8	4	6
23	5.5	6.5	20	14	106	67	317	106	22	8	4	8
24	5.5	6.5	20	14	543	67	257	106	19	8	4	6
25	5.5	7.5	17	14	395	72	276	100	19	8	4	6
26	5.5	43	17	14	203	83	257	100	17	8	4	4
27	5.5	32	17	14	144	100	238	94	15	8	4	3
28	5.5	20	17	20	124	131	203	118	13	8	4	3
29	5.5	14	14	34	.....	172	172	131	12	8	4	3
30	5.5	12	14	38	.....	144	172	106	16	8	4	3
31	5.5	.....	14	30	.....	112	.....	100	.....	8	4	.....

NOTE.—No record Oct. 13–14, 18–21, Nov. 27, Apr. 16–18, May 16–17, June 5, 14–19, 26–28, 30, and July 15; discharge interpolated.

Monthly discharge of Goodyear Creek at Goodyear Bar, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	10	5.5	6.39	393
November	43	5.5	10.8	643
December	158	14	36.2	2,230
January	38	12	16.7	1,030
February	543	20	81.2	4,510
March	172	62	82.2	5,050
April	424	100	173	10,300
May	187	94	133	8,180
June	94	12	45.9	2,730
July	19	6	10.6	652
August	8	4	4.71	290
September	8	3	4.20	250
The year	543	3	50.1	36,300

BEAR RIVER NEAR COLFAX, CALIF.

LOCATION.—Just below spillway gates about 1 mile below Pacific Gas & Electric Co.'s diversion dam and about 2 miles northwest of Colfax, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 1, 1911, to June 30, 1917.

GAGE.—Inclined staff on right bank about 60 feet below canal spillway; read by an employee of Pacific Gas & Electric Co. Original station was at dam. Present station was established August 8, 1915.

DISCHARGE MEASUREMENTS.—At medium stages made from cable at the gage, at high stages at old cable above dam, and during low water by wading.

CHANNEL AND CONTROL.—Bed of boulders; narrow and very rough. Control of solid rock, boulders, and gravel; shifts. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.2 feet at 3.30 p. m. February 24 (discharge, 5,200 second-feet); minimum stage recorded, below lower limit of gage which is stage 2.0 feet (discharge, 11 second-feet).

1911–1917: Maximum stage recorded, February 24, 1917; no flow over dam for long periods nearly every year.

DIVERSIONS.—Bear River canal diverts from the river about 1 mile above the station.

REGULATION.—Stored water from the South Fork of the Yuba River at Spalding reservoir is diverted into the drainage basin above the station after being used for power development; also some water from the North Fork of American River. Bear River canal and small placer mining reservoirs on the tributaries cause diurnal fluctuation.

ACCURACY.—Stage-discharge relation changed February 24. Rating curves fairly well defined between 15 and 3,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record and some discharge measurements furnished by Pacific Gas & Electric Co.

Discharge measurements of Bear River near Colfax, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 23	Charles Leidl	1.87	16	May 3	Pacific Gas & Electric Co.	5.20	451
Jan. 17	J. F. Kunesh	2.55	29				
17	....do	2.45	25	June 23	....do	3.20	127
Mar. 11	....do	4.62	354	July 18	J. F. Kunesh	2.20	25
Apr. 16	....do	6.00	703				

Daily discharge, in second-feet, of Bear River near Colfax, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	84	124	172	.....	179	1,290	436	348	194
2	95	131	530	.....	161	905	414	348	194
3	100	112	1,680	186	124	640	392	392	101
4	95	124	2,220	90	95	555	348	414	138
5	84	232	710	124	131	555	414	414	145
6	90	151	430	186	124	530	505	310	159
7	138	165	248	100	84	392	480	310	173
8	79	179	172	131	112	392	414	328	159
9	84	131	165	84	90	436	480	310	138
10	100	158	131	50	100	480	640	310	125
11	118	158	138	.....	55	328	1,210	348	95
12	100	100	69	.....	90	310	1,700	370	95
13	100	138	.....	.....	100	348	610	458	125
14	95	165	84	.....	55	310	1,210	292	132
15	79	138	158	.....	46	310	765	310	145
16	100	138	151	.....	38	310	765	310	132
17	172	138	118	27	186	310	580	328	45
18	186	84	158	.....	60	310	436	310	73
19	179	90	165	.....	118	348	392	348	89
20	158	74	172	.....	1,500	392	392	224	37
21	179	60	186	.....	3,630	392	392	180	37
22	112	112	69	.....	2,560	370	700	274	45
23	124	28	131	.....	1,970	328	835	274	45
24	151	55	384	.....	4,980	310	765	224	49
25	144	112	186	.....	4,020	274	700	216	58
26	144	362	124	.....	2,200	414	730	216	68
27	172	151	34	.....	2,040	392	530	138	45
28	151	165	28	.....	1,560	392	555	208	49
29	90	165	28	850	.....	580	348	166	22
30	124	124	24	920	.....	730	392	187	29
31	138	.....	.....	384	.....	555	.....	194	.....

NOTE.—No gage-height record Jan. 11–16, 18–28, and July 1 to Sept. 30.

Monthly discharge of Bear River near Colfax, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	186	79	121	7,440
November	362	28	135	8,030
February	4,980	38	943	52,400
March	1,290	274	458	28,200
April	1,700	348	618	36,800
May	458	138	292	18,000
June	194	22	98.0	5,830

BEAR RIVER AT VAN TRENT, CALIF.

LOCATION.—In SE. ¼ sec. 21, T. 14 N., R. 6 E., below highway bridge at McCourtney crossing, 1 mile below Van Trent, Placer County, and 8 miles above Wheatland.

DRAINAGE AREA.—263 square miles.

RECORDS AVAILABLE.—October 8, 1904, to September 30, 1917.

GAGE.—Staff in five sections on left bank 500 feet below bridge; read by Herman Ernestus.

DISCHARGE MEASUREMENTS.—Made by wading or from cable half a mile below gage.

CHANNEL AND CONTROL.—Solid rock, boulders, and gravel; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.2 feet at 3 p. m. February 24 (discharge, 16,200 second-feet); minimum stage recorded, 0.95 foot August 8, 21, 28, September 4, 14, and 25 (discharge, 12 second-feet).

1904–1917: Maximum stage recorded, 18.9 feet at 8 a. m. January 14, 1909 (discharge, from extension of rating curve, about 29,600 second-feet); minimum stage recorded, 0.8 foot August 28, 1913 (discharge, 8 second-feet).

DIVERSIONS.—Water is diverted above station for power and irrigation. Stored water from South Fork of Yuba River is diverted into this drainage basin above station at Colfax.

REGULATION.—A small amount of storage is developed on the headwaters of this stream. Also see information in preceding paragraph.

ACCURACY.—Stage-discharge relation changed December 4 and February 21. Rating curve used October 1 to December 4 fairly well defined below 4,000 second-feet and extended above; curve used December 5 to February 20 fairly well defined below 4,000 second-feet and extended above; curve used February 21 to September 30 well defined below 1,000 second-feet and fairly well defined above. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Bear River at Van Trent, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 9	0.78	133	Feb. 24	12.25	11,400	May 31	2.34	257
9	.76	133	Mar. 7	3.29	592	July 18	1.40	50
Dec. 10	1.61	327	Apr. 19	3.25	631	Sept. 30	1.12	2'

Daily discharge, in second-feet, of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	126	187	174	403	487	1,620	680	485	260	120	28	20
2	137	126	591	384	443	1,220	652	508	245	100	17	17
3	187	149	951	2,340	365	995	625	465	290	80	20	20
4	161	75	7,150	587	297	925	708	530	152	110	17	12
5	126	271	1,270	443	252	860	575	485	260	38	24	17
6	115	149	1,180	970	252	795	680	465	230	110	28	20
7	242	256	587	487	224	680	652	405	245	120	14	20
8	213	200	423	403	252	625	795	465	215	110	12	17
9	115	187	346	328	198	1,220	795	425	202	44	20	20
10	187	174	328	282	210	1,140	765	405	215	24	24	38
11	200	187	267	267	172	995	925	445	140	28	14	14
12	161	200	328	210	160	795	2,980	405	190	24	28	17
13	137	95	297	185	185	860	1,530	445	165	33	33	20
14	126	200	252	172	160	1,060	1,290	352	178	28	20	12
15	137	213	297	160	138	860	1,220	405	190	20	24	110
16	95	149	328	117	128	795	1,060	370	140	38	14	33
17	187	105	282	128	643	735	795	335	165	20	17	20
18	213	137	172	117	511	795	680	320	80	24	14	245
19	174	149	346	185	487	735	625	388	140	17	17	230
20	200	105	252	149	4,580	680	552	335	130	20	20	120
21	213	126	252	138	8,270	735	575	230	120	14	12	20
22	187	161	238	128	4,620	652	680	305	110	17	14	14
23	85	137	267	117	1,370	600	1,450	352	130	44	17	20
24	174	57	2,640	117	10,800	575	1,060	320	120	14	14	17
25	187	137	850	128	9,880	530	960	335	140	17	17	12
26	161	646	487	117	3,750	575	925	320	120	14	14	28
27	187	320	346	108	2,590	552	828	335	110	17	20	20
28	200	242	535	108	1,960	600	708	140	120	14	12	17
29	161	213	423	487	.....	735	575	305	110	17	14	20
30	115	200	328	1,640	.....	1,140	445	320	100	28	17	24
31	200	.....	328	1,010	.....	765	.....	275	.....	17	14	.....

Monthly discharge of Bear River at Van Trent, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	242	85	165	10,100
November	646	57	185	11,000
December	7,150	172	726	44,600
January	2,340	108	400	24,600
February	10,800	128	1,910	106,000
March	1,620	530	834	51,300
April	2,980	445	893	53,100
May	530	140	377	23,200
June	290	80	167	9,940
July	120	14	42.6	2,620
August	33	12	18.4	1,130
September	245	12	40.5	2,410
The year	10,800	12	470	340,000

BEAR RIVER CANAL NEAR COLFAX, CALIF.

LOCATION.—Just below lower spillway gates, about 1 mile below diversion dam on Bear River, and 2 miles northwest of Colfax, Placer County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1917; only discharge measurements in 1911.

GAGE.—Bristol water-stage recorder on left bank about 800 feet below the spillway gates; installed November 23, 1916. Original gage was a float in a stilling box on right bank 60 feet below spillway.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume; straight from 60 feet above to 80 feet below, where flume ends and trapezoidal earth and rock canal begins. Control is a length of channel.

EXTREMES OF DISCHARGE.—1912–1917: Maximum daily discharge recorded, 256 second-feet June 3, 1917; no flow during periods of nearly every year.

COOPERATION.—Discharge record and some measurements furnished by Pacific Gas & Electric Co.

The water is used for power development near Auburn.

Discharge measurements of Bear River canal near Colfax, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Nov. 24	Pacific Gas & Electric Co.	*Feet.* 2.42	*Sec.-ft.* 47	Mar. 17	Pacific Gas & Electric Co.	*Feet.* 4.98	*Sec.-ft.* 166
24	.....do.....	4.84	166	Apr. 2	.....do.....	5.84	229
25	.....do.....	2.50	50	16	J. F. Kunesh.....	.....	Dry.
Jan. 13	.....do.....	3.05	149	May 1	Pacific Gas & Electric Co.	5.54	249
13	.....do.....	3.22	109	1	.....do.....	5.87	269
14	.....do.....	2.62	75	2	.....do.....	5.28	222
17	J. F. Kunesh.....	3.75	115	2	.....do.....	5.78	256
17	.....do.....	3.82	111	June 2	.....do.....	5.91	210
Mar. 11	.....do.....	5.11	204	July 18	J. F. Kunesh.....	4.78	225
11	.....do.....	5.04	203	Sept. 24	Pacific Gas & Electric Co.	4.33	178
13	Pacific Gas & Electric Co.	5.59	222	25	.....do.....	5.00	221
14	.....do.....	5.66	216	25	.....do.....	5.22	237
14	.....do.....	5.66	222				
16	.....do.....	4.99	168				

Daily discharge, in second-feet, of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	131	.....	.....	184	138	210	216	228	244	233	170	206
2	129	.....	.....	220	130	205	221	217	242	191	159	146
3	134	.....	.....	207	130	213	215	206	256	230	164	167
4	126	.....	73	189	116	188	231	205	237	200	169	192
5	142	.....	94	209	113	186	236	213	243	182	154	183
6	153	.....	121	209	180	191	233	221	246	183	162	175
7	143	.....	126	111	175	198	239	211	246	183	175	191
8	115	.....	141	132	166	209	234	208	246	148	169	194
9	130	.....	126	140	180	218	229	212	244	166	180	209
10	142	.....	115	127	156	219	73	218	244	173	178	171
11	138	.....	128	149	205	192	.....	210	229	175	196	184
12	125	.....	164	174	130	207	.....	201	245	174	205	180
13	126	.....	166	166	152	207	.....	90	246	168	151	199
14	122	.....	69	158	171	241	.....	237	245	166	164	132
15	112	74	.....	155	180	201	.....	228	212	130	188	181
16	138	76	.....	167	187	211	45	222	234	164	183	124
17	.....	79	.....	193	217	211	162	218	172	187	170	156
18	.....	103	.....	195	208	211	211	211	237	178	171	164
19	.....	85	.....	164	218	211	225	226	242	192	157	172
20	.....	134	.....	167	130	211	220	128	238	172	220	179
21	.....	139	.....	157	186	220	219	192	237	175	176	174
22	.....	51	120	155	170	214	213	191	237	123	191	165
23	.....	109	124	144	200	217	216	244	246	135	182	150
24	.....	110	124	122	154	215	224	237	167	173	185	154
25	.....	122	131	153	148	222	224	239	222	179	174	190
26	.....	.....	155	145	208	213	216	237	224	160	185	172
27	.....	.....	195	143	224	240	217	208	291	148	189	172
28	.....	.....	196	133	223	189	226	230	223	170	191	164
29	.....	.....	217	128	.....	232	219	234	222	187	170	181
30	.....	.....	174	48	.....	232	222	240	238	154	172	130
31	.....	.....	189	123	.....	224	.....	244	.....	172	188	.....

NOTE.—Quantities changed slightly to conform to computation rules of U. S. Geological Survey. No flow on days for which discharge is not given.

Monthly discharge of Bear River canal near Colfax, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	153	0	67.9	4,180
November	134	0	36.1	2,150
December	217	0	95.1	5,850
January	220	48	157	9,650
February	224	113	171	9,500
March	241	186	212	13,000
April	239	0	173	10,300
May	244	90	213	13,100
June	291	167	235	14,000
July	233	123	173	10,600
August	220	151	177	10,900
September	209	124	172	10,200
The year	291	0	157	113,000

AMERICAN RIVER AND TRIBUTARIES.

NORTH FORK OF AMERICAN RIVER NEAR COLFAX, CALIF.

LOCATION.—In SW. ¼ sec. 30, T. 14 N., R. 10 E., at bridge on Colfax-Forest Hill road, 150 feet below mouth of Shirttail Canyon Creek, 5 miles southeast of Colfax, Placer County, and 11 miles above junction with Middle Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 16, 1911, to September 30, 1917.

GAGE.—Vertical staff in two sections; section No. 1 bolted to ledge on left bank 30 feet below bridge; No. 2 wedged in crevice on right bank 35 feet below bridge. December 18, 1912, to August 16, 1914, a Gurley printing water-stage recorder was in operation on the right bank 50 feet below the bridge and at the same datum. Gage read by H. P. Henning.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; tailings from placer mining; shift during high water. Banks high, rocky, and wooded; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.25 feet at 8 a. m., February 25 (discharge, 11,000 second-feet); minimum stage recorded, 2.15 feet September 15–22 (discharge, 60 second-feet).

1911–1917: Maximum stage recorded, 16.0 feet during morning of January 1, 1914, determined by high-water mark on gage in recorder well (discharge, from extension of rating curve, about 23,000 second-feet); minimum discharge recorded, 51 second-feet September 24, 1913.

DIVERSIONS.—A small ditch diverts water from Lake Valley reservoir, which is on a small tributary of North Fork of American River. This water, after passing through Alta power plant, is wasted into the Bear River drainage basin.

STORAGE.—Capacity of Lake Valley reservoir, 8,000 acre-feet. See preceding paragraph.

ACCURACY.—Stage-discharge relation changed April 13. Rating curve used until April 13 well defined below 6,000 second-feet; curve used after April 13 well defined below 3,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of North Fork of American River near Colfax, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 23	Charles Leidl	2.04	78	Mar. 10	J. F. Kunesh	4.02	945
Jan. 17	J. F. Kunesh	2.62	219	Apr. 16	do	4.93	1,410
17	do	2.62	226	May 17	do	5.53	1,930
Feb. 22	do	6.85	[a] 3,200	July 19	do	2.61	189
22	do	6.66	[a] 2,940				

[a] Area for this measurement determined from soundings taken on Mar. 10, results uncertain, owing to probable shift at section.

Daily discharge, in second-feet, of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	69	69	135	290	442	1,730	1,310	2,040	2,150	490	122	71
2	103	69	745	339	375	1,390	1,230	1,730	2,150	450	109	71
3	135	69	1,390	625	366	1,230	1,160	2,040	2,150	450	109	71
4	112	69	3,920	442	352	1,090	1,230	2,270	2,150	450	101	71
5	83	142	1,920	465	366	1,090	1,550	2,270	1,830	392	96	71
6	69	130	1,310	542	375	1,090	1,920	2,270	2,270	373	96	71
7	155	142	810	420	375	1,020	1,920	2,650	2,270	338	96	71
8	103	96	598	375	375	950	2,580	2,790	2,390	322	96	71
9	103	86	465	330	398	950	1,920	2,790	2,390	322	96	71
10	90	86	398	310	398	950	1,550	2,930	2,390	280	96	71
11	90	86	330	310	375	880	1,920	2,790	1,640	268	96	71
12	90	86	298	310	375	810	3,600	2,790	1,550	248	96	71
13	86	83	290	290	375	845	2,520	2,930	1,300	248	84	71
14	78	78	270	258	375	845	2,040	3,080	1,550	248	84	71
15	78	78	250	243	352	810	1,830	2,790	1,550	226	84	60
16	78	78	250	215	375	778	1,460	2,150	1,640	216	84	60
17	78	78	232	215	655	778	1,300	2,040	1,460	210	84	60
18	78	78	215	232	490	810	1,640	1,640	1,380	204	76	60
19	78	78	215	222	570	810	1,070	1,380	1,300	186	71	60
20	78	78	209	215	1,730	810	1,140	1,220	1,300	174	71	60
21	78	78	209	200	4,790	880	1,300	1,380	1,140	165	71	60
22	78	72	215	200	4,090	845	2,270	1,460	1,000	150	71	60
23	78	69	282	191	2,340	745	3,390	2,040	860	150	71	71
24	78	69	880	185	7,680	810	3,230	1,730	795	150	71	71
25	78	72	420	185	9,580	880	3,720	1,460	735	136	71	71
26	78	375	339	200	4,790	950	3,720	1,140	680	136	71	60
27	69	258	290	215	3,140	950	3,390	1,140	605	136	71	60
28	69	161	310	215	2,340	1,390	2,790	1,730	580	128	71	60
29	69	155	290	598	.....	1,920	2,790	2,270	533	122	71	60
30	69	130	270	880	.....	1,920	2,270	2,040	490	122	71	60
31	69	.....	310	570	.....	1,550	.....	2,150	.....	122	71	.....

Monthly discharge of North Fork of American River near Colfax, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	155	69	85.4	5,250
November	375	69	107	6,370
December	3,920	135	583	35,800
January	880	185	332	20,400
February	9,580	352	1,720	95,500
March	1,920	745	1,050	64,600
April	3,720	1,070	2,130	127,000
May	3,080	1,140	2,100	129,000
June	2,390	490	1,470	87,300
July	490	122	246	15,100
August	122	71	84.8	5,210
September	71	60	66.2	3,940
The year	9,580	60	823	596,000

AMERICAN RIVER AT FAIROAKS, CALIF.

LOCATION.—At highway bridge 1,500 feet northwest of Southern Pacific Co.'s railroad station at Fairoaks Bridge, half a mile southeast of Fairoaks, Sacramento County, and 10 miles below mouth of South Fork.

DRAINAGE AREA.—1,910 square miles.

RECORDS AVAILABLE.—November 3, 1904, to September 30, 1917.

GAGE.—Gurley printing water-stage recorder on right bank 800 feet below bridge, installed January 18, 1914. A temporary vertical staff gage on right bank about 40 feet above bridge read October 1 to December 8, 1916, and another temporary staff gage about 60 feet above the bridge read July 22 to September 30, 1917, by Edgar Cosby. These gages have independent datums. Previous to installation of recorder, several staff gages at the right abutment of bridge had been used.

The same datum has been maintained since station was established.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge, or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 13.98 feet at 7.45 a. m. February 25 (discharge, 42,300 second-feet); minimum stage, 2.0 feet on temporary gage September 3–5, 14, 18 and 21 (discharge, 83 second-feet).

1907–1917: Maximum stage recorded, 30.4 feet March 19, 1907 (discharge, from extension of rating curve, about 119,000 second-feet); minimum stage, 2.01 feet from 8 to 10.30 a. m. September 24, 1915 (discharge, from extension of rating curve, about 25 second-feet.)

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—See descriptions of Middle, North, and South forks. Low-water flow partly regulated by power plant at Folsom.

ACCURACY.—Stage-discharge relation changed February 25, 28 and April 12. Sand bar interfered with operation of recorder about July 21. Temporary staff gages were read from October 1 to December 8 and from July 21 to September 30. Rating curves developed when these gages were read are fairly well defined; rating curves used December 9 to July 21 are well defined. Mean daily gage height determined by averaging readings printed every 15 minutes by the water stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table. For periods when recorder was not running (see footnote to daily-discharge table) discharge estimated from United States Weather Bureau gage heights at Folson by means of a relation curve. Records excellent when recorder was running, good when staff gages were read, and fair for estimated periods.

Discharge measurements of American River at Fairoaks, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	Charles Leidl	a 2.11	600	Apr. 18	J. F. Kunesh	5.04	5,870
19	do	a 2.11	582	May 28	do	6.56	10,000
Nov. 10	Joseph F. Kunesh	a 2.11	565	July 14	Charles Leidl	a 3.70	1,720
10	do	a 2.12	574			3.01	
Dec. 9	Charles Leidl	a 3.00	2,200	Sept. 6	J. F. Kunesh	a 2.11	118
		3.41		6	do	a 2.27	208
Jan. 19	Joseph F. Kunesh	a 2.41	1,320	6	do	a 2.31	240
		2.93		22	Charles Leidl	a 2.04	109
Feb. 26	do	9.38	19,200	27	do	a 2.28	228
Mar. 14	Charles Leidl	4.65	4,260				

a Temporary low-water gage.

Daily discharge, in second-feet, of American River at Fairoaks, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	285	622	855	1,730	1,870	7,980	4,980	10,100	11,100	3,250	560	230
2	324	475	1,350	1,660	1,640	7,110	4,480	8,920	11,400	3,150	475	202
3	1,200	522	3,420	3,870	1,580	6,420	4,360	8,640	12,100	3,050	475	125
4	920	522	4,520	2,610	1,510	4,600	4,360	9,500	11,700	2,950	515	83
5	675	570	4,810	2,060	1,510	4,600	5,100	10,800	11,100	2,760	475	150
6	622	790	4,410	2,840	1,580	4,600	6,690	11,100	11,100	2,660	475	202
7	732	855	3,630	2,250	1,660	5,100	7,830	12,800	12,100	2,530	398	175
8	790	675	2,880	1,870	1,660	4,600	9,900	12,800	12,800	2,350	435	230
9	790	675	2,130	1,690	1,640	4,360	9,080	13,800	14,100	2,250	475	202
10	675	622	1,910	1,570	1,660	5,100	7,110	13,400	14,100	2,120	475	175
11	790	591	1,670	1,510	1,620	4,360	6,560	13,400	10,400	1,940	435	175
12	816	570	1,570	1,460	1,620	3,900	14,500	11,700	8,920	1,850	398	325
13	790	622	1,480	1,440	1,600	3,680	12,100	12,800	8,360	1,810	360	150
14	816	591	1,390	1,360	1,600	4,240	9,800	15,500	9,200	1,790	398	104
15	675	494	1,320	1,320	1,580	3,790	8,640	14,800	9,800	1,730	325	202
16	698	494	1,240	1,200	1,550	3,580	7,320	11,100	10,100	1,710	360	150
17	622	475	1,180	988	1,820	3,370	6,550	9,500	10,400	1,690	325	202
18	622	503	1,150	1,000	1,980	3,370	5,930	9,500	9,500	1,660	290	202
19	622	460	1,170	1,220	2,080	3,370	5,450	8,100	8,640	1,580	325	260
20	622	475	1,100	1,200	8,920	3,370	5,330	7,320	8,360	1,420	325	175
21	522	475	1,080	1,120	22,400	3,370	5,810	6,550	7,840	1,120	260	150
22	522	460	1,130	1,080	27,400	3,470	8,360	8,360	7,060	910	325	175
23	438	475	1,270	1,040	11,700	3,180	14,100	8,360	5,930	855	290	290
24	570	438	3,220	1,000	22,800	3,080	14,800	8,360	5,570	750	360	175
25	438	522	2,650	940	37,600	3,180	16,200	9,800	5,220	700	325	230
26	400	855	1,800	956	20,700	3,370	17,400	6,420	4,870	652	260	260
27	387	1,580	1,550	1,070	12,800	3,580	16,200	6,680	4,310	515	260	202
28	622	1,280	1,670	1,080	9,260	4,240	14,500	8,100	4,090	560	360	230
29	622	920	1,710	1,290	.....	5,880	12,400	9,500	3,770	605	260	290
30	475	920	1,510	2,020	.....	7,680	11,100	10,800	3,560	560	260	230
31	368	.....	1,490	2,720	.....	6,020	.....	10,800	.....	605	260	.....

NOTE.—No record Dec. 4-6, Mar. 3-13, May 18-21; discharge estimated from United States Weather Bureau gage heights at Folsom.

Monthly discharge of American River at Fairoaks, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,200	235	626	38,500
November	1,580	438	651	38,700
December	4,810	855	2,010	124,000
January	3,870	940	1,590	97,800
February	37,600	1,510	7,330	407,000
March	7,980	3,080	4,470	275,000
April	17,400	4,360	9,230	549,000
May	15,500	6,420	10,300	633,000
June	14,100	3,560	8,920	531,000
July	3,250	515	1,680	103,000
August	560	260	372	22,900
September	325	83	198	11,800
The year	37,600	83	3,910	2,830,000

MIDDLE FORK OF AMERICAN RIVER NEAR EAST AUBURN, CALIF.

LOCATION.—In SE. ¼ sec. 6, T. 12 N., R. 9 E., at Mountain Quarry Co.'s plant, about 1½ miles above junction with North Fork of American River and 3½ miles northeast of East Auburn, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1917.

GAGE.—Staff in three sections on left bank at pump house; read by H. M. Power and J. A. Collins.

DISCHARGE MEASUREMENTS.—Made from cable installed November 22, 1916, 700 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shift during high water. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.0 feet at 7 a. m. February 25 (discharge, from extension of rating curve, 15,600 second-feet); minimum stage recorded, 1.5 feet at 5 p. m. September 1 (discharge, 50 second-feet).

1911–1917: Maximum stage recorded, 18.0 feet at 7 a. m. January 1, 1914 (discharge from extension of rating curve, about 26,400 second-feet); minimum stage recorded, 1.0 foot at 7 a. m. October 23, 24, and 31, 1915 (discharge, 32 second-feet).

DIVERSIONS.—Little South Fork ditch diverts from Gerle Creek into Pilot Creek drainage basin. Pilot Creek ditch diverts from Pilot Creek for irrigation on Georgetown divide. The former ditch is used to supplement the latter when the flow of Pilot Creek is not sufficient. Its maximum discharge is probably less than 20 second-feet.

REGULATION.—Storage is developed in Loon Lake at the head of Gerle Creek to serve the ditches mentioned in the preceding paragraph.

ACCURACY.—Stage-discharge relation changed during floods of February 25 and April 26. Rating curve used October 1 to February 25, well defined below 7,000 second-feet; curve used February 26 to April 26, well defined between 1,200 and 5,000 second-feet; curve used April 27 to September 30, well defined below 7,000 second-feet. Gage read to tenths once daily; oftener during high water. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Middle Fork of American River near East Auburn, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	J. F. Kunesh	2.39	159	Feb. 23	J. F. Kunesh	5.69	2,820
17	Charles Leidi	2.39	169	23	do	5.67	2,880
22	do	2.30	138	Mar. 9	do	4.92	1,730
22	J. F. Kunesh	2.30	141	Apr. 15	do	6.37	3,490
Jan. 18	do	2.94	366	May 16	do	6.76	4,320
18	do	2.95	382	July 19	do	2.92	495

Daily discharge, in second-feet, of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	97	268	308	450	565	2,230	2,480	4,330	5,030	1,270	266	75
2	130	308	700	478	535	2,110	2,230	3,770	5,170	1,200	266	86
3	376	268	1,320	925	450	2,000	2,230	3,770	5,170	1,350	266	98
4	288	268	4,890	630	450	1,800	2,230	4,470	5,170	1,240	230	98
5	231	268	3,510	478	450	1,610	2,590	5,170	4,890	1,120	230	98
6	197	308	2,530	770	478	1,700	3,810	5,460	4,890	1,040	230	98
7	268	300	1,420	635	630	1,610	4,110	6,420	5,170	1,040	214	98
8	308	250	1,010	505	565	1,520	4,110	5,780	5,460	905	204	98
9	300	231	845	450	565	1,700	4,110	6,590	5,940	808	183	98
10	268	231	690	450	598	1,700	3,250	6,760	7,800	808	168	98
11	268	231	535	400	630	1,560	3,390	6,420	3,910	775	168	98
12	268	231	505	400	565	1,430	8,520	5,620	3,510	715	162	98
13	268	231	450	400	565	1,430	5,050	6,420	3,250	685	155	98
14	268	197	450	400	565	1,430	4,410	7,440	3,910	628	142	98
15	268	167	400	400	565	1,340	3,530	5,780	4,330	655	142	98
16	268	167	400	288	565	1,300	2,980	4,050	4,330	628	142	93
17	268	154	400	268	735	1,260	2,720	4,470	4,050	572	142	88
18	268	154	400	330	700	1,260	2,230	3,770	3,770	572	142	88
19	231	154	352	400	735	1,260	2,230	3,000	3,000	518	142	78
20	231	154	352	352	2,530	1,340	2,110	3,060	3,000	492	137	78
21	231	154	352	352	3,250	1,340	2,470	3,120	3,250	442	130	78
22	197	154	400	308	5,620	1,340	4,780	3,250	3,000	395	130	78
23	167	154	425	308	3,000	1,300	7,080	4,050	2,640	348	119	98
24	167	141	1,100	308	7,800	1,260	7,440	4,050	3,250	348	119	98
25	167	141	630	308	13,600	1,340	8,340	3,120	2,640	306	119	98
26	154	352	450	308	6,380	1,610	8,700	2,640	2,530	306	119	98
27	141	535	450	308	3,810	1,610	7,620	3,200	1,900	306	119	98
28	130	400	478	352	2,980	2,000	7,100	3,770	1,700	306	119	94
29	130	376	478	565	.....	2,980	5,620	4,610	1,440	266	119	88
30	130	342	400	808	.....	3,530	5,170	5,170	1,200	266	108	88
31	197	.....	450	770	.....	2,720	.....	4,890	.....	266	108	.....

NOTE.—No gage-height record Nov. 12, 30, Dec. 10, Feb. 4, Mar. 11, Apr. 8, 22, May 20, 27, June 3, 17, July 4, 22, Aug. 5, 12, 26, Sept. 2, 16, and 30; discharge interpolated.

Monthly discharge of Middle Fork of American River near East Auburn, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	376	97	222	13,700
November	535	141	243	14,500
December	4,890	308	874	53,700
January	925	268	452	27,800
February	13,600	450	2,140	119,000
March	3,530	1,260	1,700	105,000
April	8,700	2,110	4,420	263,000
May	7,440	2,640	4,660	287,000
June	7,800	1,200	3,840	228,000
July	1,350	266	664	40,800
August	266	108	163	10,000
September	98	75	92.5	5,500
The year	13,600	75	1,610	1,170,000

SOUTH FORK OF AMERICAN RIVER NEAR PLACERVILLE, CALIF.

LOCATION.—In SE. ¼ sec. 26, T. 11, N., R. 10 E., below bridge at Chilli Bar, on Placerville-Georgetown road, about 1,000 feet below Big Canyon Creek, and 3 miles northwest of Placerville, Eldorado County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 11, 1911, to September 30, 1917.

GAGE.—Staff in two sections bolted to solid rock on right bank about 1,000 feet below bridge; high-water section is painted on the rocks above second section. Gage read by John Hutter.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders, appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.25 feet at 8 a. m. February 25 (discharge, 7,620 second-feet); minimum stage recorded, 3.70 feet August 25, 26, and September 10 (discharge, 101 second-feet).

1911–1917: Maximum stage recorded, 19.0 feet at 4 p. m. January 25, 1914 (discharge, from extension of rating curve, about 15,000 second-feet); minimum stage recorded, 3.28 feet September 25, 1913 (discharge, 57 second-feet).

DIVERSIONS.—Just below the mouth of Silver Fork there is a diversion for irrigation, mining, and the municipal supply for Placerville. Power is developed near the mouth of Rock Creek by the Western States Gas & Electric Co. At low water the entire flow of the South Fork of American River is diverted for power. Occasionally the amount is insufficient and additional water is purchased from the Sierra Water Supply Co. The water diverted for power is returned to the river above the gaging station.

REGULATION.—Echo and Silver lakes are used as storage reservoirs.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 5,000 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

The following discharge measurement was made by J. F. Kunesh:

November 29, 1916: Gage height, 4.76 feet; discharge, 331 second-feet.

Daily discharge, in second-feet, of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	121	162	260	512	596	1,820	1,600	3,540	5,100	1,680	260	114
2	775	162	825	512	618	1,480	1,540	3,180	5,320	1,680	260	114
3	533	162	980	554	554	1,410	1,540	3,180	5,210	1,600	290	108
4	432	153	2,900	575	533	1,340	1,600	3,640	5,430	1,600	275	108
5	356	322	2,040	596	554	1,340	1,890	4,140	5,210	1,480	246	101
6	322	275	1,890	775	596	1,280	2,460	4,340	5,320	1,340	232	101
7	452	393	1,100	618	618	1,280	2,720	5,100	5,540	1,280	206	101
8	432	232	875	554	596	1,220	3,260	4,550	5,980	1,220	183	101
9	374	232	730	533	596	1,340	2,720	5,210	6,660	1,220	162	101
10	452	246	640	533	640	1,280	2,370	4,990	6,540	1,100	162	101
11	472	322	640	512	596	1,220	2,280	5,210	5,100	980	144	108
12	432	306	554	512	596	1,160	4,990	4,440	4,550	925	144	114
13	322	290	512	492	575	1,160	3,540	5,540	4,440	875	136	114
14	393	232	472	472	575	1,220	3,080	6,310	4,990	875	128	114
15	412	183	492	452	575	1,100	2,720	5,320	5,430	875	128	108
16	393	194	412	339	554	1,100	2,370	4,240	5,430	875	128	108
17	393	194	472	306	685	1,100	2,120	4,340	5,210	1,280	128	101
18	393	194	412	432	618	1,100	1,890	3,740	5,100	825	121	108
19	306	206	393	472	685	1,160	1,820	3,180	4,660	775	114	101
20	322	183	393	393	1,740	1,160	1,890	2,720	4,550	685	114	114
21	290	172	374	412	5,430	1,160	2,040	2,900	4,240	596	114	101
22	290	172	432	412	5,540	1,100	2,900	3,080	3,940	554	114	108
23	260	172	432	393	2,540	1,100	3,640	3,080	3,180	512	108	128
24	246	183	925	374	6,200	1,040	4,440	3,450	3,080	452	108	128
25	232	206	554	374	7,620	1,100	5,100	3,000	2,900	432	101	128
26	219	596	452	393	4,040	1,220	5,650	2,540	2,720	393	101	128
27	194	554	472	393	3,000	1,280	5,760	3,000	2,370	356	108	128
28	183	432	596	412	2,200	1,540	4,770	3,740	2,280	412	128	128
29	183	374	554	554	.....	1,890	3,840	4,040	2,120	393	121	128
30	162	290	492	685	.....	2,120	3,740	4,240	1,890	356	114	121
31	162	.....	533	775	.....	1,820	.....	4,770	.....	290	108	.....

Monthly discharge of South Fork of American River near Placerville, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	775	121	339	20,800
November	596	153	260	15,500
December	2,900	260	736	45,300
January	775	306	494	30,400
February	7,620	533	1,770	98,300
March	2,120	1,040	1,310	80,600
April	5,760	1,540	3,010	179,000
May	6,310	2,540	4,020	247,000
June	6,660	1,890	4,480	267,000
July	1,680	290	901	55,400
August	290	101	154	9,470
September	128	101	112	6,660
The year	7,620	101	1,460	1,060,000

CLEAR LAKE BASIN.

CLEAR LAKE AT LAKEPORT, CALIF.

LOCATION.—At municipal wharf on north side of Third Street at Lakeport, Lake County.

RECORDS AVAILABLE.—February 25, 1913, to September 30, 1917.

GAGE.—Vertical staff fastened to piling at municipal wharf; read once a day by C. J. Borghi.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.6 feet April 24, 27, and 28; minimum stage recorded, 1.15 feet September 30.

1913–1917: Maximum stage recorded, 11.12 feet January 28, 1914; minimum stage recorded, 0.62 foot October 29, 1913.

COOPERATION.—Gage-height record furnished by Yolo Water & Power Co.

Daily gage height, in feet, of Clear Lake at Lakeport, Calif., for the year ending Sept. 30, 1917.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.95	1.50	1.50	2.05	2.48	5.68	6.27	6.55	5.80	4.64	3.28	2.10
2	1.98	1.50	1.54	2.15	2.45	5.72	6.28	6.55	5.80	4.61	3.24	2.05
3	1.95	1.47	1.58	2.27	2.48	5.78	6.30	6.55	5.75	4.59	3.21	2.02
4	1.96	1.45	1.58	2.30	2.48	5.80	6.31	6.53	5.75	4.50	3.17	2.00
5	1.95	1.45	1.59	2.40	2.48	5.82	6.31	6.50	5.70	4.48	3.12	1.92
6	1.95	1.47	1.65	2.41	2.44	5.87	6.31	6.42	5.68	4.47	3.07	1.88
7	1.90	1.46	1.70	2.40	2.48	5.85	6.30	6.48	5.65	4.45	3.01	1.82
8	1.85	1.45	1.75	2.43	2.48	5.88	6.31	6.47	5.60	4.40	3.00	1.80
9	1.85	1.46	1.70	2.50	2.50	5.90	6.32	6.42	5.52	4.35	2.96	1.75
10	1.83	1.44	1.70	2.50	2.50	5.98	6.30	6.42	5.50	4.31	2.90	1.70
11	1.83	1.44	1.69	2.48	2.50	6.08	6.40	6.38	5.46	4.28	2.86	1.66
12	1.82	1.40	1.68	2.50	2.48	6.08	6.45	6.38	5.48	4.23	2.83	1.62
13	1.80	1.42	1.69	2.50	2.50	6.05	6.43	6.33	5.40	4.20	2.80	1.60
14	1.78	1.43	1.72	2.50	2.50	6.11	6.50	6.30	5.40	4.13	2.77	1.60
15	1.77	1.42	1.67	2.50	2.50	6.13	6.48	6.25	5.38	4.10	2.73	1.58
16	1.75	1.37	1.67	2.50	2.48	6.17	6.50	6.25	5.34	4.09	2.70	1.55
17	1.75	1.41	1.65	2.48	2.48	6.17	6.48	6.21	5.28	4.05	2.66	1.52
18	1.73	1.43	1.63	2.48	2.48	6.15	6.48	6.20	5.26	4.00	2.60	1.48
19	1.68	1.43	1.63	2.48	2.42	6.19	6.50	6.15	5.22	3.95	2.55	1.48
20	1.68	1.43	1.65	2.48	2.50	6.20	6.50	6.12	5.12	3.90	2.50	1.47
21	1.65	1.37	1.65	2.48	2.60	6.20	6.50	6.12	5.10	3.85	2.46	1.30
22	1.65	1.37	1.70	2.48	2.80	6.18	6.55	6.11	5.07	3.80	2.46	1.35
23	1.63	1.37	1.78	2.46	2.90	6.21	6.56	6.09	4.97	3.72	2.45	1.30
24	1.62	1.40	1.83	2.46	3.50	6.21	6.60	6.02	4.93	3.67	2.41	1.27
25	1.60	1.43	1.86	2.46	4.80	6.23	6.55	5.98	4.91	3.62	2.35	1.24
26	1.58	1.43	1.90	2.46	5.22	6.23	6.58	5.98	4.90	3.52	2.30	1.22
27	1.55	1.43	1.95	2.46	5.42	6.23	6.60	5.95	4.82	3.47	2.28	1.20
28	1.52	1.45	2.00	2.50	5.58	6.27	6.60	5.90	4.76	3.42	2.27	1.20
29	1.50	1.46	2.02	2.48	.....	6.20	6.58	5.90	4.75	3.40	2.21	1.17
30	1.52	1.50	2.02	2.48	.....	6.25	6.57	5.85	4.70	3.37	2.15	1.15
31	1.52	.....	2.03	2.50	.....	6.25	.....	5.85	.....	3.30	2.13	.....

CACHE CREEK BASIN.

CACHE CREEK AT YOLO, CALIF.

LOCATION.—At highway bridge half a mile south of Yolo, Yolo County, in Río Jesús María grant, 1,000 feet above Southern Pacific Co.'s railroad bridge.

DRAINAGE AREA.—1,320 square miles.

RECORDS AVAILABLE.—January 1, 1903, to September 30, 1917.

GAGE.—Staff in four sections; lower section, vertical, is fastened to pile under bridge near left bank; second section, inclined, is on right bank, 30 feet above bridge; third section, vertical, is fastened to cottonwood tree on right bank 70 feet above bridge; upper section, vertical, is fastened to upper end of right abutment. This gage was installed October 2, 1904, at the same datum as the original gage on upstream side of right pier of bridge; read by Mrs. Cornelia W. Bigelow.

DISCHARGE MEASUREMENTS.—Made from bridge, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, 25.1 feet at 8 a. m. February 25 (discharge, from extension of rating curve, 18,800 second-feet); no flow October 1–21, 26, June 27, and July 14 to September 25.

1903–1917: Maximum stage recorded, 27.8 feet at 5 p. m. February 2, 1915 (discharge, 21,100 second-feet); minimum stage, no flow for periods in nearly every year.

DIVERSIONS.—Numerous ditches divert water for irrigation above the station.

REGULATION.—At low water the channel is sometimes deepened at Lower Lake in order to increase the flow from lake.

ACCURACY.—Stage-discharge relation changed January 6, February 25, and March 1. Rating curve used up to January 6 is well defined between 40 and 1,200 second-feet; curve used January 7 to February 25 well defined between 127 and 8,000 second-feet; that used February 26–28 fairly well defined between 1,400 and 2,500 second-feet; that used March 1 to September 30 well defined below 400 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting control method used March 1–15. Records excellent except those for extremely high water.

Discharge measurements of Cache Creek at Yolo, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 11	J. F. Kunesh	1.39	73	Mar. 15	J. F. Kunesh	2.15	290
11	do	1.39	74	Apr. 12	do	1.56	117
Jan. 16	do	2.06	313	12	do	1.56	117
16	do	2.06	308	25	do	.57	5.8
Feb. 14	do	1.55	142	May 26	do	1.17	47
14	do	1.55	144	26	do	1.17	48
Mar. 1	do	4.01	1,380	July 10	McGlashan and Kunesh	.87	21
15	do	2.15	286				

Daily discharge, in second-feet, of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.
1	.....	56	30	120	404	1,360	148	25	65	16	.....
2	.....	56	30	120	348	1,070	148	9.0	51	16	.....
3	.....	68	84	586	292	868	136	1.9	65	20	.....
4	.....	68	265	517	274	764	136	1.1	58	15	.....
5	.....	79	330	390	256	670	136	1.1	11	11	.....
6	.....	79	183	1,150	256	560	136	1.1	20	29	.....
7	.....	79	141	760	256	503	123	1.1	20	27	.....
8	.....	56	120	552	229	460	136	1.1	11	25	.....
9	.....	52	106	485	206	428	143	1.1	5.5	22	.....
10	.....	38	101	424	190	488	123	1.1	1.9	3.5	.....
11	.....	25	79	385	174	402	118	1.1	5.5	1.4	.....
12	.....	15	68	366	158	353	112	1.1	14	.6	.....
13	.....	8.0	56	348	142	314	474	12	16	.6	.....
14	.....	5.0	56	348	127	292	406	15	16	.....	.....
15	.....	15	47	329	127	277	345	29	16	.....	.....
16	.....	22	47	310	127	270	306	31	16	.....	.....
17	.....	22	38	292	112	253	230	29	22	.....	.....
18	.....	30	38	292	112	236	162	42	23	.....	.....
19	.....	30	38	274	103	220	143	31	23	.....	.....
20	.....	30	38	274	112	220	73	46	23	.....	.....
21	.....	30	38	274	121	204	15	14	27	.....	.....
22	8.0	30	38	274	1,210	204	11	4.0	25	.....	.....
23	15	30	38	274	920	204	51	4.0	12	.....	.....
24	22	42	42	256	5,610	204	42	4.0	2.8	.....	.....
25	11	22	291	256	17,700	204	9.0	36	1.9	.....	.....
26	.0	22	236	256	5,160	181	1.9	65	1.1	.....	16
27	15	30	166	256	2,920	162	1.4	65	.0	.....	16
28	38	30	166	256	1,880	162	1.1	65	5.5	.....	16
29	38	30	166	256	.....	148	9.0	65	11	.....	12
30	38	30	150	404	.....	148	2.8	65	16	.....	7.0
31	47	.....	135	404	.....	148	.....	65	.....	.....	.....

NOTE.—No flow Oct. 1-21 and July 14 to Sept. 25.

Monthly discharge of Cache Creek at Yolo, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	47	0.0	7.48	460
November	79	5.0	37.6	2,240
December	330	30	108	6,640
January	1,150	120	371	22,800
February	17,700	103	1,410	78,300
March	1,360	148	386	23,700
April	474	1.1	129	7,680
May	65	1.1	23.6	1,450
June	65	.0	19.5	1,160
July	29	.0	6.04	371
August	0	.0	.0	0
September	16	.0	2.23	133
The year	17,700	.0	200	145,000

PUTAH CREEK BASIN.

PUTAH CREEK AT WINTERS, CALIF.

LOCATION.—Just below Southern Pacific Co.'s railroad bridge at Winters, Yolo County, in Rio de los Putos grant.

DRAINAGE AREA.—805 square miles.

RECORDS AVAILABLE.—September 26, 1905, to September 30, 1917.

GAGE.—Staff in five sections on left bank, 600 feet below bridge; read by Miss Velma Wyatt. An auxiliary vertical staff on right bank is used for low water. Although set to the same datum it does not read the same as left-bank gage. The original datum has been maintained. A temporary gage was used from April 25 to July 31, located 80 feet above the highway bridge and below a small diversion for pumping on right bank. This gage is set to sea-level datum.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Two channels at low water but the left channel usually carries very little water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 29.0 feet at 3 p. m., February 24 (discharge, from extension of rating curve, about 37,300 second-feet); minimum stage recorded, 3.83 feet at 6 p. m., September 20 (discharge, 1.0 second-foot).

1905–1917: Maximum stage recorded, 39.0 feet, December 31, 1913, from flood marks at gage (discharge, from extension of rating curve, about 60,000 second-feet); no flow during parts of the years ending September 30, 1913 and 1914.

DIVERSIONS.—There are several small diversions for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently during year. All curves are fairly well defined except the high-water curve which is an extension. Gage read to hundredths once daily and occasionally twice daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control methods. Records good.

COOPERATION.—Gage-height record April 25 to July 31 and some discharge measurements furnished by C. I. Rhodes.

Discharge measurements of Putah Creek at Winters, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height, in feet.		Discharge, in second-feet.	
		Temporary gage.	Regular gage.	Creek.	Ditch.
Dec. 12	J. F. Kunesh	.....	5.61	95	.....
12	.....do	.....	5.61	93	.....
Jan. 16	.....do	.....	5.73	179	.....
Feb. 13	.....do	.....	5.44	91	.....
Mar. 2	.....do	.....	7.68	1,450	.....
16	.....do	.....	6.20	470	.....
Apr. 11	.....do	.....	5.23	158	.....
25	C. I. Rhodes	8.54	.....	275	.....
26	J. F. Kunesh	.....	5.43	221	.....
May 9	Rhodes and Fraser	7.90	.....	105	.....
15	Rhodes and Fleming	7.83	.....	90	.....
24	.....do	7.69	.....	63	3
29	.....do	7.65	.....	60	3
June 2	J. F. Kunesh	.....	4.66	52	.....
5	Rhodes and Fleming	7.51	.....	36	3
13	Fraser and Fleming	7.41	.....	22	4
19	Rhodes and Fleming	7.31	.....	12	4
27	Fraser and Fleming	7.29	.....	8	3
July 3	.....do	7.19	.....	5.7	4
10	.....do	7.18	.....	4.4	3
17	Rhodes and Fleming	7.09	.....	1.8	2
24	J. F. Kunesh	.....	3.93	1.9	.....
31	Rhodes and Fleming	7.06	.....	.9	3.4
Aug. 3	C. I. Rhodes	.....	.....	a.5	a2.5
14	.....do	.....	.....	a.5	a2.5
29	.....do	.....	.....	a.5	a2.5
Sept. 12	.....do	.....	.....	a.5	a2.5

a Estimated.

NOTE.—Discharge in ditch is the amount diverted above the temporary gage and returned to the creek above the regular gage. Add 90 feet to gage readings on temporary gage to obtain elevation above sea level.

Daily discharge, in second-feet, of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.5	13	19	222	225	1,870	224	147	53	9.9	3.0	3.4
2	11	13	37	268	225	1,320	220	131	53	9.8	3.6	2.6
3	13	13	920	3,880	148	970	214	128	53	9.7	2.6	2.4
4	13	14	3,780	1,160	148	910	201	128	50	9.4	2.6	2.4
5	13	15	710	570	133	845	189	124	43	9.1	2.6	2.2
6	13	15	315	1,310	120	710	177	124	45	8.8	2.6	2.2
7	13	14	281	662	120	615	172	118	40	8.4	3.0	2.2
8	14	14	192	450	106	555	166	118	30	8.0	3.6	2.0
9	14	14	153	395	106	1,220	164	105	34	7.7	3.6	2.0
10	14	14	125	344	93	845	164	138	30	7.4	2.6	3.0
11	11	14	108	307	93	710	158	133	30	6.8	3.6	3.0
12	11	14	90	270	93	585	1,540	126	24	6.3	3.6	3.0
13	11	14	85	225	93	525	630	105	24	5.8	2.6	2.5
14	11	14	78	203	88	710	388	99	22	5.3	2.6	2.0
15	11	14	70	184	88	525	320	89	22	4.8	2.6	1.9
16	13	15	65	164	80	470	280	88	20	4.3	2.6	1.7
17	13	17	61	148	75	420	245	88	17	3.8	2.6	1.4
18	13	17	61	133	75	396	238	86	16	3.3	2.6	1.4
19	13	15	55	133	80	351	217	86	16	2.6	3.6	1.1
20	13	15	51	133	93	334	204	86	16	1.9	2.6	1.0
21	13	15	51	120	3,060	292	195	79	15	1.9	2.6	1.1
22	13	15	51	106	5,980	276	189	73	14	1.9	2.6	1.9
23	13	17	61	106	1,540	262	342	77	14	1.9	2.6	2.6
24	13	18	3,380	106	33,400	248	320	71	13	1.9	2.6	2.6
25	13	18	1,390	106	23,200	234	276	71	12	3.1	3.2	2.0
26	13	21	480	106	8,860	231	269	69	11	4.3	3.2	1.7
27	13	20	368	106	4,310	224	238	73	11	4.3	2.8	1.9
28	13	18	422	93	2,400	228	211	66	11	4.3	2.8	1.7
29	13	18	368	93	.....	214	184	63	10	4.3	2.8	1.9
30	13	18	422	344	.....	217	169	59	10	4.3	3.2	1.7
31	14	.....	268	294	.....	214	.....	56	.....	4.3	3.6	.....

NOTE.—No record Jan. 11, June 20–26, 28, 29, July 1–2, 4–9, 11–16, 18–19, 21–23, 25, 28, 29, and Sept. 13; discharge interpolated. Shifting-control method used Mar. 17 to Apr. 10 and Aug. 1 to Sept. 30. A pump with capacity of 1.2 second-feet, between regular and temporary gages, diverted water part time on July 27, Aug. 10, 13–16, 23, 25, 28, 29, and Nov. 13.

Monthly discharge of Putah Creek at Winters, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	14	9.5	12.6	775
November	21	13	15.5	922
December	3,780	19	468	28,800
January	3,880	93	411	25,300
February	33,400	75	3,040	169,000
March	1,870	214	565	34,700
April	1,540	158	283	16,800
May	147	56	96.9	5,960
June	53	10	25.3	1,510
July	9.9	1.9	5.47	336
August	3.6	2.6	2.93	180
September	3.4	1.0	2.08	124
The year	33,400	1.0	393	284,000

EEL RIVER BASIN.

MIDDLE EEL RIVER NEAR COVELO, CALIF.

LOCATION.—In E. ½ sec. 36, T. 23 N., R. 12 W., near Covelo ranger station, about 6 miles east of Covelo, Mendocino County. Williams Creek enters half a mile above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 22, 1911, to September 30, 1917.

GAGE.—Staff in two sections on left bank, about one-fourth mile west of ranger station and 1 mile below bridge; read by C. V. Brereton. Several changes in sections have been made but original location and datum have been maintained.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 23.3 feet at 6 p. m February 24 (discharge, from extension of rating curve, about 22,800 second-feet); minimum stage recorded, 7.4 feet October 1 to November 3 and August 18 to September 30 (discharge, 12 second-feet).

1911–1917: Maximum stage recorded, between 30 and 31 feet at 4.30 p. m. December 31, 1913 (discharge, between 41,500 and 47,100 second-feet); flood over top of gage and washed out high water section. Minimum stage recorded, 6.9 feet at 8 a. m. September 12, 1915 (discharge, 2.5 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 8,000 second-feet and extended above. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except those for extreme high and low water, which are fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Eel River near Covelo, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 9	10.00	557	Mar. 30	12.04	2,140	Aug. 17	7.35	13
9	10.00	551	June 18	9.73	400			
Mar. 30	12.08	2,120	18	9.73	388			

Daily discharge, in second-feet, of Middle Eel River near Covelo, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	12	63	756	519	2,070	753	1,870	818	134	26	12
2	12	12	954	1,180	573	2,070	753	1,970	818	115	26	12
3	12	12	954	630	573	2,070	753	2,070	818	99	26	12
4	12	15	2,170	422	519	1,260	818	2,070	818	85	26	12
5	12	35	1,180	3,220	519	1,190	954	2,280	753	85	26	12
6	12	40	690	1,020	573	1,120	1,020	2,610	753	73	26	12
7	12	35	573	818	573	1,040	818	2,730	690	73	22	12
8	12	35	337	519	630	970	1,340	2,730	690	63	22	12
9	12	35	300	519	630	898	2,850	3,220	690	54	22	12
10	12	30	300	519	630	825	3,220	3,090	630	54	22	12
11	12	30	266	519	630	753	9,420	2,730	573	54	18	12
12	12	22	266	519	630	753	4,800	2,390	519	46	18	12
13	12	22	235	469	630	753	4,190	1,970	519	46	18	12
14	12	18	206	469	630	753	1,180	1,680	422	40	16	12
15	12	18	206	469	630	753	1,100	1,340	422	40	16	12
16	12	18	235	422	630	753	1,100	1,340	378	220	15	12
17	12	18	235	422	630	753	1,500	1,260	378	115	14	12
18	12	18	206	378	630	954	1,340	1,180	337	73	12	12
19	12	18	206	337	573	954	2,170	1,180	300	35	12	12
20	12	18	206	337	690	954	3,760	1,100	300	35	12	12
21	12	18	206	300	2,170	990	8,090	1,100	266	35	12	12
22	12	18	206	300	1,970	1,020	10,400	1,020	235	35	12	12
23	12	18	179	300	1,260	1,020	8,470	1,020	235	35	12	12
24	12	26	337	300	18,200	1,020	7,730	954	206	35	12	12
25	12	179	337	300	14,800	1,180	6,300	954	179	35	12	12
26	12	2,070	337	300	5,960	1,680	5,620	954	134	35	12	12
27	12	300	337	300	3,480	1,870	3,220	920	134	30	12	12
28	12	266	337	573	2,730	1,970	2,500	885	134	30	12	12
29	12	179	337	1,590	.....	2,070	2,280	885	134	30	12	12
30	12	99	337	954	.....	2,170	2,070	852	134	30	12	12
31	12	.....	337	690	.....	2,500	.....	818	.....	26	12	.....

NOTE.—No record Jan. 1 and Mar. 5–10; discharge interpolated.

Monthly discharge of Middle Eel River near Covelo, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	12	12	12.0	738
November	2,070	12	121	7,200
December	2,170	63	422	25,900
January	3,220	300	640	39,400
February	18,200	519	2,240	124,000
March	2,500	753	1,260	77,500
April	10,400	753	3,350	199,000
May	3,220	818	1,650	101,000
June	818	134	447	26,600
July	220	26	61.1	3,760
August	26	12	17.0	1,050
September	12	12	12.0	714
The year	18,200	12	840	607,000

EEL RIVER AT SCOTIA, CALIF.

LOCATION.—In sec. 18, T. 1 N., R. 1 E., at Wildwood Bridge, about half a mile northeast of Scotia, Humboldt County. Laribee Creek enters about 14 miles above and Van Duzen River 7 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 15, 1910, to February 6, 1915; October 1, 1916, to September 30, 1917.

GAGE.—Staff gage in eight sections; section No. 1, 7.6 to 10.2 feet, is spiked to old cofferdam on northeast corner of footing of middle pier; No. 2, 10.2 to 16.6 feet, is painted on upstream and south corner or middle pier; No. 3, 16.3 to 18.6 feet, is painted on downstream and north face of footing of south pier; No. 4, 18.4 to 19.6 feet, is painted on vertical form brace at downstream end of south pier; No. 5, 19.4 to 27.6 feet, is painted on downstream face of south pier; No. 6, 27.4 to 35.0 feet, is painted on vertical post of first wooden bent of trestle; No. 7, 34.4 to 46.0 feet, painted on vertical post of second bent trestle; No. 8, 46.6 to 55.3 feet. painted on vertical post of third bent of trestle. Former gages at this station were destroyed when the suspension bridge was built in 1914 and when it was destroyed in 1915. The original datum has not been maintained but the new datum probably is not more than a few tenths of a foot different than the orignal. Gage read by James C. Bixler.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 51.25 feet at 7 a. m., February 25 (discharge, from extension of rating curve, 240,000 second-feet); minimum stage recorded, 8.8 feet October 11 to November 4 (discharge, 90 second-feet).

1911–1917: Maximum stage recorded, 55.5 feet February 2, 1915 (discharge, from extension of rating curve, about 290,000 second-feet); minimum stage recorded October 11 to November 4, 1916.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 25. Rating curves well defined below 120,000 second-feet and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for extremely high water.

Discharge measurements of Eel River at Scotia, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 13	8.80	89	Jan. 6	20.66	37,700	Mar. 28	13.60	7,770
Oct. 13	8.80	90	Jan. 6	19.43	31,500	June 14	11.00	1,170
Jan. 4	15.56	15,600	Jan. 7	16.54	19,300	Aug. 19	9.74	120
Jan. 5	17.28	24,000	Mar. 27	13.25	7,030			

Daily discharge, in second-feet, of Eel River at Scotia, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	90	90	1,580	4,220	9,510	24,300	8,070	8,430	2,230	535	205	106
2	90	90	3,940	8,790	7,020	16,500	8,070	7,720	2,230	535	185	100
3	90	90	24,700	27,400	5,710	13,800	8,790	6,680	2,130	535	185	100
4	90	93	33,000	16,500	4,790	11,700	8,430	6,350	2,030	508	185	100
5	90	132	15,300	18,100	4,790	12,000	8,430	6,030	2,030	490	185	100
6	90	175	11,700	36,000	4,790	11,000	8,070	6,350	1,940	490	185	100
7	90	270	8,070	18,500	4,500	9,510	8,070	6,350	1,940	490	185	100
8	90	302	4,500	12,400	4,220	9,150	8,790	6,680	1,840	472	185	100
9	90	320	3,670	9,150	3,940	13,100	9,510	6,030	1,840	445	185	100
10	90	292	2,680	7,020	3,670	16,100	8,070	6,030	1,660	400	185	100
11	90	231	2,360	5,710	3,670	13,500	18,900	5,400	1,490	400	185	100
12	90	212	2,140	5,090	3,410	12,000	43,200	5,400	1,330	384	165	100
13	90	180	1,660	4,790	3,410	11,000	26,000	5,400	1,260	336	150	90
14	90	151	1,500	4,790	3,160	12,400	18,500	5,400	1,180	320	150	90
15	90	139	1,500	3,940	2,920	11,700	15,700	4,790	1,180	307	135	90
16	90	135	1,430	3,670	2,680	9,870	13,100	4,220	1,180	288	135	90
17	90	135	1,360	3,410	2,450	9,510	11,300	3,670	1,180	288	135	90
18	90	135	1,230	2,680	2,450	9,510	9,870	3,670	1,180	288	136	90
19	90	135	1,230	2,250	2,450	9,150	8,790	3,670	1,180	255	122	90
20	90	135	1,230	2,250	3,940	8,430	8,430	3,410	1,110	255	122	90
21	90	135	1,060	2,360	13,100	8,790	8,790	3,160	1,040	255	122	90
22	90	128	1,230	2,250	43,200	8,790	20,900	2,920	975	255	122	90
23	90	128	2,250	2,040	35,000	8,430	36,500	2,920	975	245	110	94
24	90	128	11,300	1,840	114,000	7,370	25,200	2,920	910	230	110	106
25	90	180	12,800	1,660	218,000	7,020	19,300	2,560	814	205	110	110
26	90	7,720	7,720	1,580	94,800	6,680	16,500	2,450	768	205	110	110
27	90	7,370	5,400	1,940	50,300	6,680	14,600	2,340	660	205	110	110
28	90	2,800	5,710	2,040	33,000	8,070	12,400	2,230	630	205	110	110
29	90	1,750	6,030	9,510	.....	10,200	11,000	2,030	630	205	110	110
30	90	1,430	4,220	15,300	.....	11,000	9,510	2,130	580	205	110	106
31	90	.....	4,790	14,600	.....	9,150	.....	2,230	.....	205	110	.....

NOTE.—No gage-height record Oct. 1–10; discharges estimated.

Monthly discharge of Eel River at Scotia, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	90	90	90.0	5,530
November	7,720	90	840	50,000
December	33,000	1,060	6,040	371,000
January	36,000	1,580	8,120	499,000
February	218,000	2,450	24,500	1,360,000
March	24,300	6,680	10,900	670,000
April	43,200	8,070	14,400	857,000
May	8,430	2,030	4,500	277,000
June	2,230	580	1,340	79,700
July	535	205	337	20,700
August	205	110	146	8,980
September	110	90	98.7	5,870
The year	218,000	90	5,800	4,200,000

KLAMATH RIVER BASIN.

WILLIAMSON RIVER NEAR SILVER LAKE, OREG.

LOCATION.—In sec. 14, T. 30, S. R. 10 E., at Beckley ranch in Klamath County, 1 mile east of road from Klamath Falls to Silver Lake, about 42 miles from Silver Lake.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25 to September 30, 1917.

GAGE.—Vertical staff on south abutment of wagon bridge. Gage reader, Earl Powers.

DISCHARGE MEASUREMENTS.—Made from foot log about 200 feet above gage; current sluggish; conditions fairly good.

CHANNEL AND CONTROL.—Stream bed of firm sand and clay, covered during summer with growths of aquatic plants; control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records 1.85 feet May 16 (discharge, 144 second-feet); minimum stage recorded, 1.05 feet, September 25 and 26 (discharge, 59 second-feet).

ICE.—None during period covered by records.

DIVERSIONS.—A few hundred acres are irrigated from Williamson River and tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent owing to growth of aquatic plants. Daily discharge ascertained by shifting-control method. Gage read once a day to quarter-tenths. Records fair.

Discharge measurements of Williamson River near Silver Lake, Oreg., during the year ending Sept. 30, 1917.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 25	1.25	106	June 24	1.45	96
Apr. 26	1.23	104	Aug. 24	1.30	64

Daily discharge, in second-feet, of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	92	128	81	69	62	16	.....	144	112	81	64	56
2	.....	92	128	81	72	62	17	.....	140	120	81	64	56
3	.....	84	124	78	72	62	18	.....	140	109	81	64	59
4	.....	84	128	78	69	.....	19	.....	136	116	81	64	59
5	.....	84	124	78	69	.....	20	.....	136	109	75	64	59
6	.....	92	124	78	69	.....	21	.....	128	109	78	64	59
7	.....	95	120	72	69	.....	22	.....	120	109	78	64	59
8	.....	98	116	72	69	.....	23	.....	120	109	78	64	59
9	.....	102	124	72	66	.....	24	.....	120	96	75	63	62
10	.....	109	128	72	66	.....	25	106	116	92	72	63	59
11	.....	112	132	72	66	59	26	106	116	92	72	62	59
12	.....	124	124	72	66	59	27	102	120	92	72	64	62
13	.....	132	116	78	66	59	28	95	120	88	69	62	62
14	.....	132	112	75	66	56	29	95	120	84	69	62	62
15	.....	140	112	78	64	56	30	95	124	84	69	62	62
							31	.....	128	.....	69	62	.....

NOTE.—Mean estimated at 60 second-feet, Sept. 4–10.

Monthly discharge of Williamson River near Silver Lake, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 25-30	106	95	100	1,190
May	144	84	116	7,130
June	132	84	112	6,660
July	81	69	75.5	4,640
August	72	62	65.5	4,030
September	62	56	59.6	3,550
The period				27,200

WILLIAMSON RIVER AT CHILOQUIN, OREG.

LOCATION.—In NW. ¼ sec. 3, T. 35 S., R. 7 E., at new highway bridge about 500 feet above mouth of Sprague River and a few feet above old wooden bridge replaced in 1916, half a mile southwest of Chiloquin, Klamath County.

DRAINAGE AREA.—1,260 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1917; fragmentary since September, 1916.

GAGE.—Vertical staff on downstream side of left abutment of new wagon bridge since April 20, 1917; staff on upstream side of right abutment of old bridge was used prior to that date. No determined relation between the two gages. Gage read by employees of U. S. Indian Service.

DISCHARGE MEASUREMENTS.—Made from downstream side of new wagon bridge; measuring conditions poor on account of rough bottom and uneven velocities.

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; shifts slightly. A second channel to the left of the main channel always carries some water; banks low and subject to overflow at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet on new gage April 23 and 24 (discharge, 2,450 second-feet); no records available for April 27, at time Sprague River was highest. Minimum stage recorded, 0.55 foot on new gage September 3 (discharge, 395 second-feet).

1911–1917: Maximum stage recorded, 6.6 feet April 16, 1913 (discharge, 2,520 second-feet); minimum stage recorded, 3.80 feet August and September, 1915 (discharge, 370 second-feet).

ICE.—Stage-discharge relation unaffected by ice as most of the water comes from springs.

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed with relocation of gage April 20. Rating curves fairly well defined and applicable October 1 to April 19 and April 20 to September 30, respectively. Gage read to hundredths at low stages and half-tenths at high stages, on days for which discharge records are published. Daily discharge ascertained by applying daily gage height to rating table.

Discharge measurements of Williamson River at Chiloquin, Oreg., during the period Oct. 1, 1916, to Nov. 1, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1916.		*Feet.*	*Sec.-ft.*	1917.		*Feet.*	*Sec.-ft.*
Oct. 9	Batchelder and Reinekking	3.87	418	May 1	R. C. Briggs	2.85	1,860
				June 25	do	.94	531
1917.				Aug. 7	H. W. Humphrey [a]	.65	413
Apr. 20	H. W. Humphrey [a]	2.69	1,590	Sept. 3	R. C. Briggs	.55	413
23	R. C. Briggs	3.40	2,450	Nov. 1	do	.67	410

[a] Employee U. S. Reclamation Service.

Daily discharge, in second-feet, of Williamson River at Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.
1						510	1,870			
2						510				
3		535								395
4						560				
5			510		442	560				
6										
7									425	
8						610				395
9	400		465							
10	420		465			670				
11						740				
12										
13						585				
14						610				
15										
16						1,230				
17						1,420		560		
18						1,420				
19			465			1,720				
20						1,720		560		
21						2,020				
22						2,340				
23						2,450				
24				465		2,450				
25								540		
26										
27		488								
28	465									
29		465								
30										
31										

NOTE.—Total yearly run-off estimated as 440,000 acre-feet.

WILLIAMSON RIVER BELOW SPRAGUE RIVER, NEAR CHILOQUIN, OREG.

LOCATION.—In sec. 3, T. 35 S., R. 7 E., about one-fourth mile below mouth of Sprague River and three-fourths mile southwest of Chiloquin, Klamath County.

DRAINAGE AREA.—2,810 square miles.

RECORDS AVAILABLE.—June 25 to September 30, 1917. The sum of discharge records at stations on Williamson and Sprague rivers above their junction is directly comparable with these records.

GAGE.—Friez water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage section. Stream bed broken by rocky ledges and current somewhat uneven.

CHANNEL AND CONTROL.—Rocky ledge and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 1.79 feet at time of current-meter measurement June 25 (discharge, 1,400 second-feet); minimum stage from water-stage recorder, 1.01 feet September 8 to 10 (discharge, 718 second-feet).

1911–1917: Maximum discharge, determined by adding records obtained at stations above junction, about 7,000 second-feet April 27, 1917; Williamson River estimated as 2,500 second-feet. Minimum combined discharge, 568 second-feet August 31 and September 1, 1915.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Modoc Point canal diverts water past station, and large areas of land are irrigated from the river and its tributaries.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory up to September 18; no record September 19–30. Daily discharge ascertained by applying mean daily gage-height to rating table. Records excellent.

COOPERATION.—Station installed and part of field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Williamson River below Sprague River, near Chiloquin, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 25	R. C. Briggs	1.79	1,420
Aug. 7	H. W. Humphrey	1.00	733
Sept. 3	R. C. Briggs	1.05	745

Daily discharge, in second-feet, of Williamson River below Sprague River, near Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	1,160	766	758	16	.....	879	774	742
2	.....	1,140	782	750	17	.....	862	774	742
3	.....	1,100	782	750	18	.....	838	774	742
4	.....	1,050	790	742	19	.....	814	774	.....
5	.....	1,010	790	736	20	.....	798	774	.....
6	.....	987	790	730	21	.....	798	774	.....
7	.....	960	790	724	22	.....	790	774	.....
8	.....	951	790	718	23	.....	798	774	.....
9	.....	942	790	718	24	.....	806	774	.....
10	.....	924	790	726	25	1,400	798	774	.....
11	.....	906	790	734	26	.....	798	782	.....
12	.....	897	790	734	27	.....	790	782	.....
13	.....	888	790	734	28	1,280	790	774	.....
14	.....	879	782	742	29	1,230	782	774	.....
15	.....	879	774	742	30	1,180	774	758	.....
					31	.....	774	758	.....

NOTE.—Mean discharge, Sept. 19–30, estimated 750 second-feet.

Monthly discharge of Williamson River below Sprague River, near Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July	1,160	774	889	54,700
August	790	758	779	47,900
September	.....	718	742	44,200
The period	.....	.....	.....	147,000

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

LOCATION.—In sec. 30, T. 38 S., R. 9 E., at outlet of Upper Klamath Lake, about 2 miles northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 28 to October 22, 1904; January 7, 1906, to September 30, 1917.

GAGE.—Friez water-stage recorder since February 16, 1906; vertical staff prior to that date. Zero of gage is 4,136.13 feet above sea level. During 1904, gage was a vertical staff on Pelican Bay; zero of which was 4,135.997 feet above sea level.[1] Operation of water-stage recorder unsatisfactory a considerable part of the time. Observer, Graham Keihl.

[1] U. S. Geol. Survey Bull. 556, p. 86.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 6.81 feet at 7 p. m. April 7; minimum stage from water-stage recorder, 3.50 feet at 4 a. m. September 2.

1904 and 1906–1917: Highest water ever known, determined from high-water marks, 7.2 feet on Pelican Bay gage or 4,145.1 feet above sea level, about April 20, 1914. Minimum stage is probably that of 1917.

FLUCTUATION.—Gage heights are very much affected by the wind. The water is lowered near the outlet when the wind blows from the south and is raised as much above its normal level when the wind is in the opposite direction. There is a periodic oscillation when the wind blows for any length of time.

COOPERATION.—Since May, 1909, this station has been maintained by the United States Reclamation Service.

Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	.....	4.7	4.7	.....	.....	.....	6.10	5.20	4.00	4.05
2	.....	.....	.....	.....	4.7	.....	.....	5.85	6.10	5.20	4.15	4.00
3	.....	.....	.....	.....	4.7	4.85	5.1	.....	5.95	.....	.....	3.98
4	.....	4.2	.....	.....	4.7	.....	.....	.....	6.00	.....	.....	4.12
5	.....	.....	.....	.....	.....	.....	.....	6.23	.....	.....	4.30	.....
6	.....	.....	.....	4.7	.....	.....	4.8	.....	.....	.....	.....	.....
7	4.2	.....	4.6	4.7	.....	.....	.....	6.50	.....	4.95	.....	4.10
8	.....	.....	.....	.....	.....	.....	.....	.....	5.80	4.90	.....	4.05
9	4.3	.....	4.6	.....	.....	.....	.....	.....	.....	4.90	.....	4.00
10	.....	.....	4.6	.....	4.7	4.9	.....	.....	.....	4.90	.....	4.17
11	.....	5.0	.....	.....	4.7	4.9	5.5	.....	5.70	4.93	4.15	.....
12	.....	.....	.....	.....	4.7	.....	.....	5.95	.....	.....	.....	4.30
13	.....	.....	.....	4.7	.....	.....	.....	6.12	5.50	4.80	.....	4.25
14	4.2	.....	.....	.....	.....	.....	.....	6.20	.....	4.83	.....	4.17
15	.....	.....	4.6	.....	.....	.....	.....	6.30	.....	4.80	.....	4.20
16	.....	.....	4.6	4.7	.....	.....	.....	6.10	5.55	4.78	.....	4.15
17	4.0	.....	.....	.....	4.7	4.85	.....	6.20	5.60	.....	.....	4.15
18	.....	4.4	.....	.....	.....	.....	.....	6.20	5.60	.....	4.20	4.18
19	.....	.....	.....	4.7	.....	.....	5.9	6.30	5.60	.....	.....	4.15
20	.....	.....	.....	4.7	.....	.....	.....	6.22	5.55	.....	.....	4.10
21	4.2	.....	.....	.....	.....	.....	.....	6.30	5.70	.....	.....	.....
22	.....	.....	.....	.....	.....	.....	.....	6.30	5.60	4.55	.....	4.15
23	.....	.....	4.7	.....	.....	4.9	.....	6.30	5.40	.....	.....	.....
24	.....	.....	.....	.....	4.8	4.9	.....	6.30	.....	.....	.....	.....
25	.....	.....	.....	4.7	.....	.....	.....	6.25	.....	.....	.....	.....
26	.....	.....	.....	4.7	.....	.....	.....	6.10	.....	.....	4.10	.....
27	.....	.....	4.7	4.7	.....	.....	.....	.....	.....	.....	.....	.....
28	4.25	.....	.....	4.7	.....	.....	6.05	.....	.....	4.50	.....	.....
29	.....	.....	.....	4.7	.....	.....	5.82	.....	.....	.....	.....	4.15
30	.....	.....	4.7	4.7	.....	.....	.....	6.00	5.25	4.20	.....	.....
31	.....	.....	4.7	4.7	.....	4.9	.....	6.00	.....	4.12	.....	.....

LINK RIVER AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 38 S., R. 9 E., at county bridge over Link River, at Klamath Falls, Klamath County, 1¼ miles below outlet of Upper Klamath Lake, immediately above head of Lake Ewauna.

DRAINAGE AREA.—3,110 square miles.

RECORDS AVAILABLE.—May 15, 1904, to September 30, 1917.

GAGE.—Friez water-stage recorder on left bank, about 500 yards above bridge in the NW. ¼ sec. 32; elevation of zero is 4,080.0 feet above sea level. Friez recorder on opposite bank and a little farther upstream was used June 6, 1908, to August 30, 1912. Chain gage on the bridge used 1904 to 1908 and for periods when recorder was not working until 1914, when daily readings were discontinued. Observer, Myrtle Ess.

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DISCHARGE MEASUREMENTS.—Made from bridge; section deep; current sluggish at low water.

CHANNEL AND CONTROL.—Rocks and boulders in rapids; mud and sand at bridge. The control for the gage is evidently permanent and water from the tailrace of California-Oregon Power Co.'s plant, which enters the river opposite the gage, appears to affect it the same as if it came down the river channel. The stage discharge relation at the chain gage is affected by backwater from Lake Ewanna, especially when the wind is blowing.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.8 feet at 7 a. m. May 9 (discharge, 4,330 second-feet); minimum stage during year, 4.68 feet at 4 a. m. November 4 (discharge, 620 second-feet).

1904–1917: Maximum stage, 7.30 feet at gage at bridge May 12, 1904, determined May 15, 1904, from high-water marks (discharge, 9,400 second-feet); minimum stage since September, 1912, 3.74 feet at 8 a. m. August 8, 1915 (discharge as estimated from downward extension of rating curve, about 200 second-feet). Minimum stage is due to effect of wind on Upper Klamath Lake, and river is said to have gone nearly dry at times.

ICE.—Stage-discharge relation not affected by ice.

DIVERSION.—The main or "A" canal of the Klamath project of the United States Reclamation Service diverts water from Link River immediately below the lower end of Upper Klamath Lake. For record of this diversion, see page 279. Some water is also diverted for irrigation from the tributaries to Upper Klamath Lake, but the total run-off is as yet only slightly affected.

REGULATION.—The only artificial regulation is caused by operation of power plant and is small. Marked natural fluctuations are caused by effect of wind on Upper Klamath Lake.

ACCURACY.—Stage-discharge relation for medium and high stages changed sometime between May, 1916, and March, 1917. Beginning October 1, 1916, new rating curve used which was fairly well defined between 1,000 and 4,000 second-feet, but somewhat uncertain for lowest stages. Operation of water-stage recorder satisfactory except December 30 to February 3, April 22 to May 8, and May 27 to June 4; partial record during these periods. Daily discharge for periods October 1 to December 6 and July 15 to September 30, ascertained by use of discharge integrator. Daily discharge for rest of year ascertained by applying to the rating table the mean daily gage height determined by inspecting gage-height graph. Records excellent February to April; fair October to January; good May to September.

COOPERATION.—Most of field data furnished by United States Reclamation Service, J. B. Bond, project manager.

Discharge measurements of Link River at Klamath Falls, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 24	Briggs and Henshaw	5.98	1,780
24	....do	5.98	1,790
Apr. 25	H. W. Humphrey	7.35	3,650

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,000	925	1,100	a1,640	a1,720	1,840	1,900	3,580	a3,590	2,340	1,010	950
2	1,030	880	1,030	a1,660	a1,720	1,840	1,960	a3,660	3,580	2,340	965	855
3	955	885	1,140	a1,670	1,720	1,840	1,960	a3,730	a3,400	2,340	1,010	875
4	950	990	1,150	a1,690	1,720	1,840	1,960	a3,800	3,230	2,210	1,020	930
5	940	890	1,280	a1,700	1,720	1,840	2,020	3,880	3,090	2,210	1,010	900
6	1,100	1,050	1,370	1,720	1,720	1,840	2,020	a3,940	3,090	2,140	1,000	880
7	915	975	1,410	1,720	1,660	1,840	2,080	a3,990	3,020	2,080	965	900
8	845	990	1,460	1,720	1,660	1,900	2,140	a4,050	3,020	2,020	940	885
9	865	980	1,500	1,720	1,660	1,840	2,140	4,100	3,160	1,900	975	870
10	890	1,100	1,500	1,720	1,660	1,840	2,210	3,960	3,090	1,840	1,000	895
11	835	1,100	1,500	a1,720	1,660	1,840	2,280	3,800	3,020	1,780	990	910
12	845	1,020	1,500	a1,720	1,660	1,840	2,340	3,800	2,810	1,720	945	1,020
13	845	1,010	1,500	1,720	1,660	1,840	2,400	a3,830	2,880	1,660	925	1,050
14	860	1,020	1,500	a1,710	1,610	1,840	2,540	a3,850	2,740	1,610	925	930
15	850	1,020	1,500	a1,700	a1,630	1,840	2,540	3,880	a2,840	1,630	890	1,000
16	835	1,020	1,500	a1,690	a1,640	1,840	2,540	3,730	2,950	1,610	870	1,020
17	895	a1,050	1,500	a1,690	1,660	1,840	2,600	3,730	2,810	1,590	935	1,010
18	955	1,080	1,500	a1,680	1,660	1,780	2,670	3,800	2,810	1,550	920	1,010
19	895	1,040	1,500	a1,670	1,720	1,780	2,670	3,800	2,810	1,520	995	980
20	855	1,040	1,500	1,660	1,780	1,840	2,740	3,730	2,740	1,480	970	960
21	865	1,030	1,500	a1,660	1,780	1,780	2,810	3,730	2,740	1,460	965	870
22	1,070	1,040	1,560	a1,660	1,840	1,780	a3,020	3,730	2,600	1,390	950	1,020
23	900	1,040	1,560	1,660	1,780	1,780	a3,240	3,730	2,540	1,320	955	1,020
24	875	1,060	1,610	1,660	1,840	1,840	a3,450	3,730	2,470	1,370	930	930
25	885	1,060	1,610	1,660	a1,870	1,840	3,660	3,730	2,470	1,270	920	940
26	885	1,150	1,610	1,660	1,900	1,840	a3,660	3,660	2,400	1,130	850	940
27	960	1,140	1,610	1,720	1,840	1,840	a3,660	a3,650	2,340	1,220	940	940
28	885	1,150	1,610	1,780	1,840	1,900	3,660	a3,640	2,340	1,200	950	955
29	855	1,190	1,610	1,720	.....	1,960	3,580	a3,620	2,280	1,180	1,020	950
30	885	1,190	1,610	1,720	.....	1,960	3,510	a3,610	2,280	1,100	955	980
31	940	.....	1,630	a1,720	.....	1,900	.....	a3,600	.....	1,040	945	.....

a Interpolated.

Monthly discharge of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,100	835	909	55,900
November	1,190	880	1,040	61,900
December	1,630	1,030	1,470	90,400
January	1,780	1,640	1,690	104,000
February	1,900	1,610	1,730	96,100
March	1,960	1,780	1,840	113,000
April	3,660	1,900	2,670	159,000
May	4,100	3,580	3,780	232,000
June	3,590	2,280	2,840	169,000
July	2,340	1,040	1,650	101,000
August	1,020	850	956	58,800
September	1,050	855	946	56,300
The year	4,100	835	1,790	1,300,000

Total monthly discharge of Link River and A canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,100	835	909	55,900
November	1,190	880	1,040	61,900
December	1,630	1,030	1,470	90,400
January	1,780	1,640	1,690	104,000
February	1,900	1,610	1,730	96,100
March	1,960	1,780	1,840	113,000
April	3,660	1,900	2,670	159,000
May	4,100	3,580	3,780	232,000
June	3,670	2,620	3,110	185,000
July	2,640	1,350	1,890	116,000
August	1,320	933	1,130	69,500
September	1,080	887	981	58,400
The year	4,100	835	1,850	1,340,000

KLAMATH RIVER AT SPENCER BRIDGE, NEAR KENO, OREG.

LOCATION.—In sec. 32, T. 39 S., R. 7 E., at highway bridge about a mile below Spencer Creek, 6 miles below former station at Keno, and 18 miles west of Klamath Falls, Klamath County, on road to Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1913, to September 30, 1917. Records at Keno, May 31, 1904, to December 31, 1913, give results smaller by the relatively small flow contributed by Spencer Creek.

GAGE.—Vertical staff near upstream end of first concrete pier at east end of bridge. Gage reader, Bertha Spencer.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge or at low water by wading. The bridge is supported by bents 20 feet apart, center to center, resting on concrete footings about 2 feet wide and extending above high water. The upstream end of these piers is immediately under the upstream handrail. The meter has generally been suspended from the upstream projection of certain floor beams where velocities have not been influenced by the piers. Measurements by wading have been made just above the bridge.

CHANNEL AND CONTROL.—Heavy gravel and boulders; practically permanent; bed very even.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet May 10 and 12 (discharge, 4,450 second-feet); minimum stage recorded, 0.03 foot September 25 (discharge, 963 second-feet).

1904–1917: Maximum stage recorded at Keno, 15.3 feet about May 10, 1904, from high-water marks observed May 31 (discharge, 9,250 second-feet); minimum stage at Keno, 11.5 feet October 2, 1908 (discharge, 730 second-feet). Stage-discharge relation varied considerably at Keno station. The lowest discharge obtained as the result of a measurement was 680 second-feet (stage, 12.0 feet) November 3, 1905.

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Only a small quantity of water diverted below Klamath Falls station. At times water finds its way into Lower Klamath Lake through Klamath Straits; at other times the flow is into the river. Much of the winter flow of Lost River is diverted into Klamath River between Klamath Falls and Keno stations.

REGULATION.—Some natural regulation due to effect of wind on the wide flat stretches of river above Keno.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined and confirmed by current-meter measurements, made in 1918. Gage read to hundredths three times a week. Daily discharge ascertained by applying daily gage heights to rating table. Records good except those for extremely low water, which are only fair, owing to diurnal fluctuations.

COOPERATION.—Field data furnished by United States Reclamation Service, J. B. Bond, project manager, Klamath project.

No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Klamath River at Spencer Bridge, near Keno, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1						2,100		3,890				1,100
2	1,060	1,200	1,510	1,970					3,750		1,360	
3					1,900	2,100	2,190	4,010		2,460		
4		1,310		1,940							1,280	1,010
5	1,060		1,610				2,280	4,210	3,650	2,280		
6				1,900	2,210	2,120						996
7	1,060	1,240	1,610				2,280		3,450	2,280	1,260	
8					2,070	2,120		4,410				974
9		1,260	1,630	1,870					3,650		1,160	
10					1,870	2,140	2,310	4,450		2,170		
11		1,220		1,890							1,160	1,010
12	1,120		1,660				2,460	4,450	3,160	2,120		
13				1,920	1,810	2,120						1,040
14	1,100	1,220					2,570		3,070	2,120	1,160	
15					1,870	2,140						1,040
16		1,290		2,030					3,030		1,160	
17	1,110				1,840	2,080	2,890	4,250		1,920		
18		1,220		2,620							1,100	1,040
19	1,160		1,660				2,800	4,250	2,890	1,900		
20					1,920	2,050						985
21	1,170	1,330	1,650				2,890		2,850	1,900	1,100	
22					1,940	2,030		4,250				974
23		1,360	1,660	1,870					2,640		1,100	
24	1,180				1,980	2,070	3,160	3,850		1,660		
25		1,380		2,210							1,100	963
26	1,170		1,970				3,450	4,210	2,710	1,550		
27				1,810	2,100	2,140						996
28	1,170	1,470	2,030				3,790		2,460	1,440	1,100	
29						2,150		3,850				1,020
30		1,480		1,870					2,440		1,100	
31	1,180					2,150		3,750		1,440		

Monthly discharge of Klamath River at Spencer Bridge, near Keno, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,180	1,060	1,130	69,500
November	1,480	1,200	1,310	78,000
December	2,030	1,510	1,700	105,000
January	2,620	1,810	1,990	122,000
February	2,210	1,810	1,960	109,000
March	2,150	2,030	2,110	130,000
April	3,790	2,190	2,760	164,000
May	4,450	3,750	4,140	255,000
June	3,750	2,440	3,060	182,000
July	2,460	1,440	1,940	119,000
August	1,360	1,100	1,160	71,300
September	1,100	963	1,010	60,100
The year	4,450	963	2,030	1,460,000

KLAMATH RIVER NEAR SEIAD VALLEY, CALIF.

LOCATION.—In NE. ¼ sec. 13, T. 46 N., R. 12 W., above highway bridge 300 feet above mouth of Walker Creek, 1½ miles southeast of Seiad Valley, Siskiyou County, and 11½ miles below mouth of Scott River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1912, to September 30, 1917.

GAGE.—Staff in five sections fastened to trees on left bank one-fourth mile above highway bridge; read by M. J. Brickley.

DISCHARGE MEASUREMENTS.—Made from cable 35 feet below gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.9 feet May 14 and 15 (discharge, 9,760 second-feet); minimum stage recorded, 3.3 feet September 13–16 (discharge, 1,300 second-feet).

1913–1917: Maximum stage recorded, 13.3 feet at 9.30 p. m. December 31, 1913 (discharge, from extension of rating curve, about 26,500 second-feet); minimum stage recorded, 3.3 feet August 29 to September 23, 1915, and September 13–16, 1917 (discharge, 1,300 second-feet).

DIVERSIONS.—Water is diverted from main river and tributaries above the station for use in irrigation, placer mining, and power development.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 10,000 second-feet and extended above. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating rable. Records excellent.

Discharge measurements of Klamath River near Seiad Valley, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	J. F. Kunesh	3.82	1,930	May 20	J. F. Kunesh	6.80	6,940
29	do	3.82	1,850	July 13	McGlashan and Kunesh	4.68	3,110
May 20	do	6.80	6,880	Sept. 17	J. F. Kunesh	3.57	1,560

Daily discharge, in second-feet, of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,640	2,020	2,550	2,700	3,020	5,150	5,550	7,470	7,690	4,210	2,150	1,640
2	1,640	2,020	2,550	2,860	3,020	4,210	5,550	7,470	7,690	4,210	2,020	1,640
3	1,760	2,020	2,550	2,860	3,020	4,210	5,350	7,250	7,690	4,030	2,020	1,640
4	1,760	2,020	2,550	2,860	3,020	3,850	3,350	7,030	7,250	4,030	2,020	1,640
5	1,890	2,020	2,550	3,340	3,020	3,680	5,550	7,250	7,250	3,680	2,020	1,520
6	1,890	2,020	2,700	3,340	3,180	3,680	6,380	7,470	7,250	3,680	1,890	1,520
7	1,890	2,020	2,700	3,180	3,180	3,850	6,590	7,910	7,030	3,680	1,890	1,520
8	1,890	2,150	2,700	3,180	3,180	3,850	6,810	8,140	7,030	3,680	1,890	1,410
9	1,890	2,150	2,700	3,180	3,180	3,850	7,030	8,140	7,470	3,680	1,890	1,410
10	1,760	2,150	2,700	3,020	3,510	3,850	7,250	8,140	7,250	3,510	1,890	1,410
11	1,760	2,150	2,700	2,860	3,510	3,850	8,140	8,370	7,250	3,510	1,890	1,410
12	1,760	2,150	2,700	2,860	3,510	3,850	6,810	8,830	6,810	3,340	1,890	1,410
13	1,760	2,150	2,700	2,860	3,510	3,680	7,250	8,830	5,960	3,180	1,890	1,300
14	1,760	2,150	2,550	2,860	3,510	3,680	6,380	9,760	5,960	3,020	1,760	1,300
15	1,760	2,150	2,550	2,860	3,510	3,510	6,380	9,760	7,030	3,020	1,760	1,300
16	1,760	2,150	2,550	2,860	3,510	3,510	6,380	8,830	7,030	3,020	1,760	1,300
17	1,760	2,150	2,700	3,020	3,510	3,510	5,750	8,370	6,810	2,860	1,760	1,410
18	1,760	2,150	2,700	3,020	3,510	3,510	5,350	8,370	6,170	2,860	1,760	1,520
19	1,760	2,150	2,700	3,020	3,340	3,510	5,350	7,690	6,170	2,860	1,760	1,520
20	1,760	2,150	2,700	3,020	3,510	3,680	5,750	7,250	5,750	2,700	1,760	1,520
21	1,760	2,150	2,700	2,860	3,510	3,680	5,750	7,470	5,550	2,700	1,760	1,640
22	1,890	2,150	2,700	2,860	3,680	3,680	6,380	7,250	5,150	2,700	1,640	1,640
23	1,890	2,150	2,700	2,860	3,680	3,850	5,750	7,030	5,150	2,410	1,640	1,640
24	1,890	2,280	2,700	2,860	3,680	3,850	8,140	7,030	5,150	2,410	1,640	1,640
25	1,890	2,280	2,700	2,860	9,290	3,850	8,830	7,030	5,150	2,280	1,640	1,640
26	1,890	2,700	2,700	2,860	7,030	5,960	9,060	7,030	4,770	2,280	1,640	1,640
27	1,890	2,700	2,700	2,860	5,350	5,550	9,060	7,250	4,390	2,150	1,640	1,640
28	1,890	2,550	2,700	2,860	4,580	5,960	8,600	7,250	4,210	2,150	1,640	1,640
29	1,890	2,550	2,700	3,020	.....	6,810	8,140	7,690	4,030	2,150	1,640	1,640
30	1,890	2,550	2,700	3,180	.....	5,960	7,910	7,690	4,030	2,150	1,640	1,640
31	1,890	.....	2,700	3,180	.....	5,150	.....	7,690	.....	2,150	1,640	.....

Monthly discharge of Klamath River near Seiad Valley, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,890	1,640	1,820	112,000
November	2,700	2,020	2,200	131,000
December	2,700	2,550	2,660	164,000
January	3,340	2,700	2,970	183,000
February	9,290	3,020	3,820	212,000
March	6,810	3,510	4,220	259,000
April	9,060	5,350	6,750	402,000
May	9,760	7,030	7,830	481,000
June	7,690	4,030	6,200	369,000
July	4,210	2,150	3,040	187,000
August	2,150	1,640	1,800	111,000
September	1,640	1,300	1,520	90,400
The year	9,760	1,300	3,730	2,700,000

KLAMATH RIVER NEAR REQUA, CALIF.

LOCATION.—In sec. 29, T. 13 N., R. 2 E., at Scofield Ferry,, about 9 miles above Requa, Del Norte County, and mouth of river, and 30 miles below mouth of Trinity River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 25, 1910, to September 30, 1917.

GAGE.—Staff in four sections on right bank at ferry cable; read by S. A. McBeth.

DISCHARGE MEASUREMENTS.—Made from ferry cable.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.0 feet at 3.25 p. m. February 22 (discharge, 73,700 second-feet); minimum stage recorded, 5.7 feet September 13–19, 29, and 30 (discharge, 2,760 second-feet).

1911–1917: Maximum stage recorded, 33.3 feet at 1 p. m. February 2, 1915, (discharge, from extension of rating curve, about 182,000 second-feet); minimum stage recorded, 5.3 feet September 23 and 24, 1911, (discharge, 2,440 second-feet).

DIVERSIONS.—Water is diverted for irrigation and power development from main river and tributaries in Oregon and California.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Stage-discharge relation changed February 22. Rating curves well defined below 60,000 second-feet and extended above; curves identical above 9,100 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Klamath River near Requa, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 3	5.85	3,080	June 12	11.20	18,500
3	5.85	3,240	Aug. 25	5.81	2,870
June 10	12.45	26,100			

Daily discharge, in second-feet, of Klamath River near Requa, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,010	3,480	14,800	8,500	11,400	23,000	24,800	38,500	26,800	10,700	3,720	2,860
2	3,110	4,900	13,600	10,400	12,000	22,600	25,800	37,300	25,800	10,400	3,720	2,860
3	3,340	5,820	13,200	12,400	13,200	18,500	26,400	37,300	24,800	10,400	3,720	2,860
4	3,220	6,840	12,800	13,600	14,400	21,260	27,400	36,700	23,000	10,000	3,540	2,860
5	3,220	8,500	11,700	14,800	13,600	20,800	27,900	36,100	23,400	9,720	3,380	2,860
6	3,220	7,940	11,000	16,000	12,800	20,300	29,000	36,100	23,900	9,400	3,380	2,860
7	3,220	5,820	10,000	14,400	13,200	20,300	28,400	35,500	24,400	9,100	3,240	2,860
8	3,220	5,340	9,400	13,600	13,200	19,800	27,900	33,700	25,400	8,200	3,100	2,860
9	3,220	4,900	9,400	10,700	13,600	19,000	29,600	33,100	27,400	7,900	3,100	2,860
10	3,220	4,900	8,800	10,000	13,200	18,500	30,700	31,300	24,800	7,600	3,100	2,860
11	3,220	4,680	7,380	9,400	12,400	18,500	33,700	31,300	22,100	7,600	2,980	2,860
12	3,220	4,680	7,940	8,800	12,800	18,000	35,500	31,900	19,400	7,320	3,100	2,860
13	3,220	3,780	8,500	9,100	12,800	17,200	39,100	31,900	19,400	7,320	3,240	2,760
14	3,220	3,780	8,220	10,000	13,600	17,200	40,900	30,700	19,400	7,320	3,240	2,760
15	3,220	3,940	8,500	8,500	14,000	16,800	40,300	29,000	19,400	7,040	3,100	2,760
16	3,220	3,780	8,800	8,220	14,400	16,400	39,700	26,400	19,400	6,760	3,100	2,760
17	3,220	4,100	9,100	8,220	14,800	16,000	37,900	25,400	19,400	6,760	3,100	2,760
18	3,220	3,940	9,400	8,500	16,400	15,600	36,700	24,400	18,000	6,200	3,100	2,760
19	3,220	3,620	14,400	7,940	17,200	15,600	35,500	24,800	17,200	5,940	3,100	2,760
20	3,220	3,620	12,000	7,660	24,400	16,000	33,100	25,400	16,400	5,680	3,100	2,860
21	3,220	3,620	10,400	8,500	41,500	18,000	29,600	25,400	16,000	5,680	2,980	2,860
22	3,220	3,620	7,660	9,720	73,700	18,500	30,100	25,800	15,200	5,420	2,860	2,860
23	3,220	3,620	8,220	10,400	59,700	21,200	33,100	26,400	14,000	5,180	2,860	2,860
24	3,220	5,820	8,500	14,800	56,900	19,400	33,700	26,400	12,400	4,940	2,860	2,860
25	3,220	8,220	9,100	14,400	45,700	19,800	34,900	26,800	12,400	4,720	2,860	2,860
26	3,220	23,000	7,940	11,700	33,700	20,800	37,300	24,800	12,000	4,500	2,860	2,860
27	3,220	11,700	7,380	11,400	27,900	21,600	38,500	23,900	12,000	4,500	3,100	2,860
28	3,220	12,400	6,840	11,700	26,400	22,100	40,900	23,000	11,700	4,300	2,860	2,860
29	3,220	13,600	6,580	15,600	.....	22,100	41,500	24,800	11,400	4,100	2,980	2,760
30	3,220	14,000	6,580	12,000	.....	22,600	39,100	26,800	10,700	4,100	2,860	2,760
31	3,480	.....	8,800	11,700	.....	23,000	.....	27,900	.....	3,900	2,860	.....

NOTE.—No record June 11 and 13–16; discharge interpolated.

Monthly discharge of Klamath River near Requa, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	3,480	3,010	3,220	198,000
November	23,000	3,480	6,600	393,000
December	14,800	6,580	9,580	589,000
January	16,000	7,660	11,100	683,000
February	73,700	11,400	23,200	1,290,000
March	23,000	15,600	19,400	1,190,000
April	41,500	24,800	33,600	2,000,000
May	38,500	23,000	29,600	1,820,000
June	27,400	10,700	18,900	1,120,000
July	10,700	3,900	6,860	422,000
August	3,720	2,860	3,130	192,000
September	2,860	2,760	2,830	168,000
The year	73,700	2,760	13,900	10,100,000

SCOTT CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 18, T. 31 S., R. 7 E., about 4 miles west of Bend-Klamath Falls road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 16 to September 30, 1917.

GAGE.—Vertical staff on right bank of creek; read by Earl Jackson and G. S. Hoyt.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of pumice; banks covered with brush; control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.02 feet July 15 (discharge, 31 second-feet); minimum stage recorded, 1.11 feet September 28 (discharge, 8 second-feet).

ICE.—No record during winter period.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during September. Fairly well-defined rating curve used June 15 to September 3; indirect shifting-control method thereafter. Gage read to quarter-tenths once a week but stage does not fluctuate rapidly. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Scott Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1917.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 16	1.59	19.2
Aug. 31	1.11	10.1

Daily discharge, in second-feet, of Scott Creek near Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Date.	Second-feet.	Date.	Second-feet.	Date.	Second-feet.
June 16	19	July 22	30	Aug. 31	10
22	24	29	27	Sept. 3	9.5
July 1	24	Aug. 5	24	10	9.4
8	26	12	19	20	8.3
15	30	17	11	28	8.0

Monthly discharge of Scott Creek near Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
June 15-30	22	654
July	27	1,660
August	16	984
September	8.8	524
The period		3,820

SAND CREEK NEAR FORT KLAMATH, OREG.

LOCATION.—In sec. 29, T. 31 S., R. 7 E., about 3½ miles above bridge on Bend-Fort Klamath road and 25 miles by road from Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 15 to September 30, 1917.

GAGE.—Vertical staff on south bank of creek.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Stream bed of shifting pumice; control not well defined. Banks low but well defined at gage; about 100 yards below gage the stream spreads and some water disappears in the pumice soil.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 15 to September 30, 1.56 feet July 15 (discharge, 83 second-feet); minimum stage recorded, 0.76 foot September 20 (discharge, 24 second-feet).

ICE.—Stream freezes in winter; no record.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; rating curve well defined between 20 and 50 second-feet. Gage read about once a week to hundredths. Records fair.

Discharge measurements of Sand Creek near Fort Klamath, Oreg., during the year ending Sept. 30, 1917.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 15	1.14	50
Aug. 31	.79	24.8

Daily discharge of Sand Creek near Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Date.	Second-feet.	Date.	Second-feet.	Date.	Second-feet.
June 15	50	July 22	80	Aug. 31	25
22	63	29	63	Sept. 3	25
July 1	67	Aug. 5	55	10	25
8	71	12	47	20	23
15	84	17	32	28	25

Monthly discharge of Sand Creek near Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
June 15-30	60	1,780
July	73	4,490
August	40	2,460
September	24	1,430
The period		10,100

NORTH FORK OF SPRAGUE RIVER NEAR BLY, OREG.

LOCATION.—In sec. 35, T. 35 S., R. 14½ E., at Dennis ranch, 10 miles north of Bly, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 18 to September 30, 1917.

GAGE.—Vertical staff on right bank, one-fourth mile above a diversion dam and 1½ miles above ranch buildings.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed of coarse gravel; part of old beaver dam may form a partial control.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.10 feet June 9 (discharge, 480 second-feet); minimum stage recorded, 1.47 feet September 7 (discharge, 32 second-feet).

ICE.—Stream freezes; no winter records.

DIVERSIONS.—Sprague River Irrigation Co.'s canal diverts water around gage. Two measurements of the quantity carried gave 21 second-feet on July 3 and 16 second-feet on September 8. Water was turned in during last part of May and canal probably carried 15 to 22 second-feet until middle of July, when water was cut down for having possibly to about 10 second-feet. It was increased to about 15 second-feet the last part of August and continued to carry this amount until near the end of September.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of June 7 to 11; two fairly well defined rating curves used. Gage read once a day to quarter-tenths. Daily discharge ascertained by supplying daily gage heights to rating table. Records good except those for discharge above 300 second-feet, which are fair.

Discharge measurements of North Fork of Sprague River near Bly, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 18	R. C. Briggs	2.22	63	Sept. 8	R. C. Briggs	1.47	32.5
May 8	do	3.21	235	12	Henshaw and Briggs	1.49	33.7
July 3	do	2.12	97				

Daily discharge, in second-feet, of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	124	394	108	38	38	16	.....	219	332	42	46	a 41
2	.....	119	315	104	42	34	17	.....	172	337	43	48	40
3	.....	100	a 311	97	48	33	18	63	119	314	46	48	40
4	.....	159	307	a 106	50	33	18	a 72	141	306	44	48	40
5	.....	150	359	114	a 50	33	20	80	168	292	42	a 45	38
6	.....	208	389	80	50	33	21	89	159	266	44	42	36
7	.....	188	430	75	50	33	22	86	168	206	40	43	34
8	.....	230	402	69	51	32	23	100	208	202	40	42	a 42
9	.....	266	480	67	50	33	24	89	226	198	48	42	50
10	.....	283	450	64	51	42	25	136	188	175	46	42	48
11	.....	307	367	54	41	42	26	172	208	166	44	a 41	48
12	.....	367	341	51	a 44	36	27	136	212	147	44	40	50
13	.....	328	380	48	46	46	28	116	341	132	42	38	50
14	.....	414	332	44	44	44	29	a 128	386	124	44	38	50
15	.....	341	314	a 43	46	42	30	141	354	121	43	36	51
							31	.....	349	.....	46	36	.....

a Interpolated.

Monthly discharge of North Fork of Sprague River near Bly, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet)
	Maximum.	Minimum.	Mean.	
April 18-31	172	63	108	2,780
May	414	100	232	14,300
June	480	121	296	17,600
July	114	40	58.8	3,620
August	51	36	44.4	2,730
September	51	32	40.4	2,400
The period	.....	.....	.....	43,400

SPRAGUE RIVER NEAR YAINAX, OREG.

LOCATION.—In NW. ¼ sec. 20, T. 36 S., R. 13 E., about 2 miles above highway bridge on road from Yainax to Silver Lake, 4 miles above mouth of Sycan River, and 10 miles east of Yainax, Klamath County.

DRAINAGE AREA.—513 square miles.

RECORDS AVAILABLE.—April 19, 1912, to September 30, 1917.

GAGE.—Stevens water-stage recorder on left bank; installed February 20, 1914, at site of vertical staff gage, which was read about once a week prior to that date. Gage reader, L. F. Belknap.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage; at high stages, from wagon bridge 2 miles downstream, and inflow estimated.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; control not well defined, as stream is very sluggish for miles above and below gage; banks subject to overflow at a stage of about 5 feet and considerable water may flow in a cut-off across a bend to the right of the station.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.75 feet at 8 p. m. April 24 (discharge, 1,320 second-feet). Recorder indicated a minimum of 0.62 foot between November 26 and March 27 (discharge, 101 second-feet).

1912-1917: Maximum stage recorded is that of 1917; minimum stage, 0.6 foot, indicated by recorder between December 16, 1915, and February 16, 1916 (discharge, 100 second-feet). There was recorded at a station 2 miles downstream, on May 21, 1904, a discharge of 2,080 second-feet.

ICE.—Stage-discharge relation seldom affected by ice, as stream is spring fed.

DIVERSIONS.—Considerable water is diverted near Bly for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent, except during summer, when it was affected by growth of aquatic plants. Well-defined rating curve used October 1 to June 16; transition curve, to allow for effect of aquatic growth, June 17 to September 30. Water-stage recorder operated satisfactorily October 5 to November 25 and May 27 to July 5. No observer during winter; recorder did not run after July 5. Gage read once a day to tenths September 16-30. Records good, except those for July and August, which are poor because of fragmentary gage height record.

Discharge measurements of Sprague River near Yainax, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	Batchelder and Reineking	1.00	136	Apr. 7[b]	R. C. Briggs	5.61	1,500
May 27	Briggs and Henshaw	1.85	253	10[b]	do	4.83	1,030
29	R. C. Briggs	4.23	705	15[b]	do	4.29	863
30	do	4.88	824	May 4	do	3.85	640
Apr. 3	do	3.18	497	June 30	do	2.15	259
6	do	5.44	[a]1,020	Sept. 7	do	.87	124
6[b]	do	5.56	1,500	11	do	.90	128

[a] Does not include overflow. [b] Measurement made from wagon bridge 2miles below gage.

Daily discharge, in second-feet, of Sprague River near Yainax, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	136	.....	690	690	900	253	.....	.....
2	.....	136	.....	590	650	870	239	.....	.....
3	.....	136	.....	510	630	870	225	.....	.....
4	.....	136	.....	550	630	840	211	160	.....
5	126	148	.....	710	650	810	188	.....	.....
6	136	148	.....	1,100	690	810	a 186	.....	.....
7	136	136	.....	1,220	760	810	a 183	.....	124
8	136	148	.....	1,430	870	810	a 180	.....	a 124
9	136	148	.....	1,290	840	840	178	.....	a 124
10	136	148	.....	940	870	900	a 177	.....	a 124
11	136	136	.....	1,100	900	990	a 175	.....	124
12	136	126	.....	1,290	990	940	a 174	.....	a 124
13	136	136	.....	1,040	1,100	870	a 172	124	a 124
14	136	136	.....	785	1,100	785	a 171	.....	a 124
15	136	136	.....	690	1,100	735	a 170	.....	a 124
16	136	148	.....	570	1,100	690	a 168	.....	124
17	136	148	.....	490	990	670	a 167	.....	115
18	136	148	.....	450	870	640	a 166	.....	115
19	136	148	.....	432	810	640	a 164	.....	115
20	136	136	.....	470	760	615	a 163	142	115
21	136	136	.....	670	735	590	a 161	.....	115
22	136	148	.....	840	690	540	a 160	.....	115
23	136	148	.....	1,160	650	515	a 158	.....	124
24	136	136	.....	1,360	670	455	a 157	.....	133
25	136	148	.....	1,290	690	415	a 155	.....	133
26	136	.....	.....	1,220	670	375	a 154	.....	133
27	136	.....	276	1,160	690	335	a 152	.....	133
28	136	.....	450	990	690	315	151	.....	133
29	136	.....	710	870	735	297	b 150	.....	133
30	136	.....	870	760	840	267	b 150	.....	133
31	136	.....	840	.....	900	.....	b 150	.....	.....

a Interpolated. b Estimated.

NOTE.—Mean discharge estimated as follows: Oct. 1–4, 125 second-feet; Nov. 26–30, 150 second-feet; Sept. 1–6, 130 second-feet.

Monthly discharge of Sprague River near Yainax, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	136	.....	134	8,240
November	.....	126	143	8,510
March 27–31	870	276	629	6,240
April	1,430	432	889	52,900
May	1,100	630	805	49,500
June	990	267	671	39,900
July	253	150	174	10,700
August	.....	.....	a 140	8,610
September	.....	115	126	7,500

a Estimated.

NOTE.—Total yearly run-off estimated as 224,000 acre-feet.

SPRAGUE RIVER AT CHILOQUIN, OREG.

LOCATION.—In NE. ¼ sec. 3, T. 35 S., R. 7 E., half a mile above mouth and same distance above Southern Pacific Railroad bridge, where station was located up to October 31, 1914, half a mile below diversion dam of Modoc Point canal of United States Indian Service, and about three-fourths mile south of Chiloquin, Klamath County.

DRAINAGE AREA.—1,550 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1917; partly fragmentary.

GAGE.—Friez water-stage recorder on right bank 500 feet above wagon bridge; installed June 25, 1917. Vertical staff on wagon bridge was read November 1, 1914, to June 25, 1917, and a chain gage on railroad bridge up to October 31, 1914.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and boulders; heavy control; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.3 feet at time of measurement April 27 (discharge, 4,490 second-feet); minimum stage from water-stage recorder, 1.00 foot at 2 p. m. July 31, caused by closing of sluice gate in diversion dam (discharge, 240 second-feet; including Modoc Point canal, 259 second-feet).

1911–1917: Maximum stage recorded in 1917; minimum natural discharge, including Modoc Point canal, 293 second-feet September 1–5, 1915.

ICE.—Stage-discharge relation affected by ice only during short periods of extremely cold weather.

DIVERSIONS.—The Modoc Point canal, completed in 1915, diverted some water around the gage, of which a partial record was kept. A considerable quantity of water is also diverted for irrigation in the headwaters of Sprague and Sycan rivers.

REGULATION.—Manipulation of sluiceway of diversion dam may cause some fluctuation at the gage.

ACCURACY.—Stage-discharge relation practically permanent at each station. Rating curves well defined; that for old gage changed slightly at high stages on basis of measurement of April 27. Gage read to hundredths up to June 23 on days for which discharge has been published. Operation of recorder satisfactory June 28 to July 7 and July 20 to September 20. Daily discharge ascertained by applying to rating table the daily gage reading or the mean daily gage height obtained by inspecting the recorder graph. Records good June to September. Data inadequate for determination of monthly discharge prior to June.

Discharge measurements of Sprague River at Chiloquin, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	Batchelder and Reineking	0.51	351	Apr. 27	R. C. Briggs	5.30	4,490
Apr. 10	Norris Bostwick[a]	2.80	1,940	May 1	do	4.10	2,980
11	do	3.20	2,140	June 18	do	2.30	1,350
24	R. C. Briggs	2.60	1,600	25	do	1.65	892
				Sept. 3	do	.47	322

[a] Employee of United States Indian Service.

Daily discharge, in second-feet, of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1					1,160	2,950		612	332	326
2					1,230			580	338	326
3		392						548	338	320
4					1,120			519	332	314
5				403	1,100			498	332	314
6					1,090			484	332	302
7					1,160			464	332	302
8					1,370				338	308
9	344				1,480				338	308
10					1,760				338	308
11					2,040				332	314
12					2,320				332	314
13					2,180				332	320
14					1,920			350	332	320
15					1,920				326	320
16									626	320
17					1,880		1,370		326	320
18							1,370		326	326
19					1,520		[a] 1,280		326	326
20					1,340		1,200	302	326	326
21							[a] 1,140	314	326	
22					1,290		[a] 1,080	314	326	
23					1,500		1,020	344	326	
24			410		1,600		[a] 940	344	326	
25							860	332	326	
26							[a] 820	326	332	
27					4,490		[a] 770	338	332	
28							728	338	332	
29							674	338	338	
30							638	338	332	
31								332	332	

[a] Interpolated.

NOTE.—Mean discharge estimated as follows: July 8–13, 407 second-feet; July 15–19, 326 second-feet; Sept. 21–30, 330 second-feet.

Monthly discharge of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 17–31	1,370	638	992	27,500
July	612	302	390	24,000
August	338	326	331	20,400
September		302	321	19,100
The period	1,370	302		91,000

Combined monthly discharge of Sprague River and Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
June 17–30	1,020	28,300
July	422	25,900
August	353	21,700
September	340	20,200
The period		96,100

NOTE.—Total yearly run-off estimated as 530,000 acre-feet.

SYCAN RIVER NEAR YAINAX, OREG.

LOCATION.—In NW. ¼ sec. 28, T. 35 S., R. 12 E., about 5 miles by stream above mouth and 16 miles northeast of Yainax, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 25, 1911, to October 29, 1917, when station was moved 2 miles upstream.

GAGE.—Stevens water-stage recorder on left bank; inspected by W. C. Robinson and L. F. Belknap. Vertical staff in sec. 3, T. 36 S., R. 12 E., about 3 miles below present gage, was used 1911 to 1913.

DISCHARGE MEASUREMENTS.—Made from cable 15 feet upstream from gage, or by wading.

CHANNEL AND CONTROL.—Stream bed gravel and sand; heavy growth of aquatic plants in summer; shifting. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.25 feet about 8 a. m. April 25 (discharge, estimated from extension of rating curve, 2,250 second-feet); minimum stage indicated by water-stage recorder between October 12 and March 28 (clock stopped), 0.18 foot (discharge, 15 second-feet).

1911–1917: Maximum and minimum discharge are those of 1917.

ICE.—Stage-discharge relation apparently not seriously affected by ice, as most of low-water flow comes from springs.

DIVERSIONS.—Some water is used for irrigation by flooding Sycan Marsh.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent except during October, 1916 and from June 14 to September 15, 1917, when it was affected by growth of aquatic plants. Rating curves applicable as follows: October 5–11, 1916 and June 14 to September 15, 1917, transition curve fairly well defined; March 28 to June 13, well defined below 700 second-feet; indirect method for shifting control used September 16 to October 28, 1917. Operation of water-stage recorder satisfactory beginning March 28 except June 19–24 and September 8–11. Daily discharge ascertained by applying to the rating table the mean daily gage height determined by inspecting recorder graph. Records good except those for last week in April, which are fair.

Discharge measurements of Sycan River near Yainax, Oreg., during the period Oct. 1, 1916, to Oct. 31, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	Briggs and Henshaw...	0.36	23.7	May 3	R. C. Briggs.....	4.50	556
28	R. C. Briggs.....	.39	26.2	5	.....do.....	4.25	502
Apr. 8	.....do.....	1.14	84	July 2	.....do.....	1.64	83
14	.....do.....	3.33	352	Sept. 7	.....do.....	.65	21.2
21	.....do.....	4.56	568	Oct. 23	.....do.....	.58	24.9

Daily discharge, in second-feet, of Sycan River near Yainax, Oreg., for the period Oct. 1, 1916, to Oct. 31, 1917.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1			25	630	698	99	27	25	27
2			26	550	670	84	28	25	26
3			28	532	650	80	28	23	26
4			32	514	650	71	28	23	26
5	25		41	496	610	71	30	23	24
6	26		46	532	570	67	30	21	24
7	26		62	570	550	67	30	21	24
8	26		88	610	532	67	31	a21	23
9	27		88	590	532	71	31	a22	23
10	27		74	630	532	63	30	a23	23
11	27		128	610	570	63	30	a24	23
12			245	690	610	63	28	24	
13			316	750	570	60	28	24	
14			364	770	514	56	27	24	
15			316	790	430	60	27	23	
16			300	905	370	60	26	24	
17			245	810	310	56	27	24	
18			232	730	295	56	26	23	
19			258	650	a280	56	26	22	
20			380	630	a265	52	27	21	
21			550	590	a250	49	27	21	
22			835	514	a235	46	26	22	
23			1,320	478	a220	43	25	22	25
24			1,990	478	a205	40	25	23	25
25			2,090	514	190	37	25	22	25
26			2,010	514	175	36	27	23	25
27			1,820	478	160	34	27	25	a24
28		26	1,550	496	140	32	25	26	a24
29		28	1,250	532	121	32	25	26	24
30		26	905	630	116	31	25	25	a24
31		25		710		29	25		a24

a Interpolated.

NOTE.—Discharge for Oct. 12–22, 1917, estimated as 24 second-feet.

Monthly discharge of Sycan River near Yainax, Oreg., for the period Mar. 28 to Oct. 31, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 28–31	28	25	26.2	208
April	2,090	25	587	34,900
May	905	478	610	37,500
June	690	116	400	23,800
July	99	29	55.8	3,430
August	31	25	27.3	1,680
September	26	21	23.2	1,380
October	27	23	24.3	1,490
The period				104,000

WHISKEY CREEK NEAR BEATTY, OREG.

LOCATION.—In sec. 19, T. 36 S., R. 12 E., at wagon bridge on road between Yainax and Beatty, about 4 miles east of Yainax, Klamath County, 2 miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27 to June 5, 1917, with occasional readings thereafter.

GAGE.—Vertical staff on main channel; read by Olive Jackson.

DISCHARGE MEASUREMENTS.—Made from bridges; four channels at highest stages; one at low water. Conditions unfavorable.

CHANNEL AND CONTROL.—Stream bed of mud; brush along banks; fall in stream very slight; control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.7 feet March 28 (discharge, 350 second-feet); minimum stage recorded, 1.0 foot at time of current-meter measurement July 2 (discharge, 12.8 second-feet).

ICE.—Stage-discharge relation affected by backwater from ice below gage March 27 to April 4.

DIVERSIONS.—Some bottom land above station irrigated by flooding.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to tenths once a day March 27 to June 5; considerable diurnal fluctuation during March and April. Daily discharge ascertained by applying daily gage height to rating table. Records fair for period when gage was read.

Discharge measurements of Whiskey Creek near Beatty, Oreg., during the year ending Sept. 30, 1917.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 30	2.15	49.5	Apr. 11	2.58	254	July 2	1.00	12.8
Apr. 1	1.80	26.6	Apr. 13	2.22	72	Sept. 7	1.21	13.3
Apr. 5	2.17	62	May 7	1.85	32.0			

Daily discharge, in second feet, of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1917.

Day.	Mar.	Apr.	May.	June.	July.	Sept.	Day.	Mar.	Apr.	May.	June.	July.	Sept.
1	.....	27	48	14	.....	.....	16	.....	44	21	.....	.....	.....
2	.....	42	44	14	13	.....	17	.....	44	29	.....	.....	.....
3	.....	64	40	14	.....	.....	18	.....	44	29	.....	.....	.....
4	.....	66	36	14	.....	.....	19	.....	36	21	.....	.....	.....
5	.....	63	44	13	.....	.....	20	.....	54	25	.....	.....	.....
6	.....	75	36	.....	.....	.....	21	.....	67	21	.....	.....	.....
7	.....	100	36	.....	.....	14	22	.....	130	21	.....	.....	.....
8	.....	130	36	.....	.....	.....	23	.....	130	18	.....	.....	.....
9	.....	67	29	.....	.....	.....	24	.....	130	21	.....	.....	.....
10	.....	67	36	.....	.....	.....	25	.....	130	18	.....	.....	.....
11	.....	246	29	.....	.....	15	26	.....	90	21	.....	.....	.....
12	.....	90	29	.....	.....	.....	27	38	67	21	.....	.....	.....
13	.....	72	29	.....	.....	.....	28	278	62	21	.....	.....	.....
14	.....	67	29	.....	.....	.....	29	98	57	16	.....	.....	.....
15	.....	54	29	.....	.....	.....	30	57	52	16	.....	.....	.....
							31	53	.....	14	.....	.....	.....

NOTE.—Gage not read Apr. 6, 7, and Apr. 28 to May 3; discharge estimated.

Monthly discharge of Whiskey Creek near Beatty, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 27–31	278	38	105	1,040
April	246	27	78.2	4,650
May	48	14	24.6	1,510
June	.....	.....	*a* 13	774
July	.....	.....	*a* 13	799
August	.....	.....	*a* 13	799
September	.....	.....	*a* 13	774
The period	.....	.....	.....	10,300

a Estimated.

MODOC POINT CANAL NEAR CHILOQUIN, OREG.

LOCATION.—In SE. ¼ sec. 3, T. 35 S., R. 7 E., at intake about a mile south of Chiloquin, Klamath County.

RECORDS AVAILABLE.—June 14, 1915, to September 30, 1917.

GAGE.—Inclined staff on left of concrete-lined section, about 100 feet below head gates; installed June 29, 1915. Previous to that date readings were made on gage at bridge, one-half mile below.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section of canal begins immediately below gage; bottom width, 10 feet; grade, 2.64 feet per mile. Operation of controlling wasteway about a mile below apparently does not affect stage-discharge relation at intake, but did have a material effect at the gage on the bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet July 14 (discharge, 43 second-feet). Canal dry at times; 95 second-feet was diverted July 10, 1915, but most of it turned back into river at first wasteway.

ACCURACY.—Stage-discharge relation practically permanent during season. Rating curve well defined. Gage read to quarter-tenths but not regularly. Daily discharge ascertained by applying gage reading to rating table. Canal dry from about October 20 to April 15. Records good for August; roughly approximate for rest of season.

Discharge measurements of Modoc Point canal near Chiloquin, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 9	C. L. Batchelder	1.58	18.8
June 18	R. C. Briggs	1.78	25.0
Sept. 13	....do	1.73	22.5

Daily discharge, in second-feet, of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	June.	July.	Aug.	Sept.	Day.	Oct.	June.	July.	Aug.	Sept.
1	.....	.....	.....	22	22	16	.....	.....	.....	22	.....
2	.....	.....	.....	22	22	17	.....	25	.....	22	.....
3	.....	.....	.....	22	23	18	.....	24	.....	22	.....
4	.....	.....	.....	22	22	19	.....	.....	.....	22	.....
5	.....	.....	.....	22	22	20	.....	24	.....	22	.....
6	.....	.....	.....	22	22	21	.....	.....	.....	22	.....
7	.....	.....	.....	22	22	22	.....	24	.....	22	.....
8	.....	.....	.....	22	.....	23	.....	24	.....	22	.....
9	19	.....	.....	22	.....	24	.....	.....	.....	22	.....
10	.....	.....	.....	22	.....	25	.....	24	.....	22	.....
11	.....	.....	.....	22	.....	26	.....	.....	.....	22	.....
12	19	.....	.....	22	.....	27	.....	.....	.....	22	.....
13	.....	.....	.....	22	23	28	.....	.....	19	22	.....
14	.....	.....	43	22	.....	29	.....	.....	19	22	.....
15	.....	.....	.....	22	.....	30	.....	.....	19	22	5
						31	.....	.....	19	22	.....

Monthly discharge of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 17-30	.....	.....	a 24.0	666
July	.....	19	a 32.0	1,970
August	22	22	22.0	1,350
September	23	5	a 18.8	1,120
The period	.....	.....	.....	5,110

a Estimated from incomplete record.

NOTE.—Total yearly run-off estimated as 8,000 acre-feet.

WOOD RIVER AT FORT KLAMATH, OREG.

LOCATION.—In sec. 22, T. 33 S., R. 7½ E., at highway bridge one-fourth mile east of Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1911, to September 30, 1917.

GAGE.—Vertical staff attached to bridge; read by Mrs. E. A. Page.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Clean gravel overlain with pumice sand, dunes of which may at times be observed moving downstream; likely to shift.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 1.9 feet May 1 (discharge, 370 second-feet); minimum discharge, 216 second-feet September 22, 23 and 26-30.

1911 and 1913-1917: Maximum stage recorded, 2.50 feet July 24, 1913 (discharge, 495 second-feet, somewhat uncertain). The lowest stage on record is 0.90 foot January 21-23, 1913 (discharge not computed).

ICE.—Stage-discharge relation unaffected by ice, as most of the water comes from copious springs a few miles above.

DIVERSIONS.—Considerable water is diverted above station for watering hay lands, mostly in May and June.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent on account of log jams. Daily discharge ascertained by indirect method April 24 to September 30. Data inadequate for determination of discharge October 1 to April 23. Gage read once daily to half-tenths. Records good April to September.

COOPERATION.—Gage-height records and some discharge measurements furnished by United States Reclamation Service.

Discharge measurements of Wood River at Fort Klamath, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	C. L. Batchelder	2.60	263	June 17	R. C. Briggs	1.33	258
Apr. 29	R. C. Briggs	1.70	324	July 23	H. W. Humphrey	1.60	285
May 12	H. W. Humphrey	1.67	293	Aug. 28	do	1.40	239
June 14	do	1.20	252	Sept. 1	R. C. Briggs	1.42	274

Daily discharge, in second-feet, of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	370	251	262	285	274	16	.....	274	262	240	262	220
2	.....	345	240	262	285	267	17	.....	285	258	240	262	220
3	.....	309	230	285	274	267	18	.....	285	251	240	274	220
4	.....	297	220	297	274	267	19	.....	285	251	251	262	220
5	.....	297	230	309	274	262	20	.....	285	251	262	251	220
6	.....	321	230	297	274	251	21	.....	274	262	285	251	220
7	.....	297	230	297	274	251	22	.....	274	262	285	251	216
8	.....	285	251	297	274	240	23	.....	274	262	280	251	216
9	.....	309	262	297	262	230	24	357	285	262	285	240	226
10	.....	297	240	274	262	220	25	345	274	262	285	240	226
11	.....	309	251	251	262	220	26	345	251	262	285	240	216
12	.....	293	251	251	262	230	27	345	251	274	285	240	216
13	.....	309	251	251	262	230	28	321	240	285	285	239	216
14	.....	297	252	251	262	230	29	324	251	285	285	251	216
15	.....	285	251	251	262	230	30	321	262	274	285	251	216
							31	.....	262	.....	285	262	.....

Monthly discharge of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April 24-30	357	321	337	4,680
May	370	240	288	17,700
June	285	220	253	15,100
July	309	240	274	16,800
August	285	239	260	16,000
September	274	216	232	13,800
The period	.....	.....	.....	84,100

FOURMILE CREEK NEAR ODESSA, OREG.

LOCATION.—In NW. ¼ sec. 9, T. 36 S., R. 5 E., just below outlet of Fourmile Lake about 15 miles northwest of Odessa, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 6, 1912, to August 8, 1917, when station was discontinued.

GAGE.—Stevens water-stage recorder about 500 feet below outlet of lake since October 23, 1914, to replace Barrett & Lawrence recorder used since October 18, 1912. Vertical staff 10 feet below dam was used April 6 to August 8, 1912. Gage read by L. J. Wilson.

DISCHARGE MEASUREMENTS.—Made from a footbridge near gage or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy, angular boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.20 feet June 26 and 27 (discharge, 96 second-feet); creek dry at times.

1912-1917: Maximum stage recorded, 2.5 feet about June 8, 1912, on old gage, estimated June 11 from high-water marks (discharge, 99 second feet).

ICE.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—None.

REGULATION.—None; storage dam has never been operated.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve for 1916 used as no discharge measurements were made during 1917. Gage read once a day to hundredths May 25 to July 6. Operation of water-stage recorder fairly satisfactory July 11 to August 8. Daily discharge ascertained by applying to the rating table the mean daily gage height determined by inspecting recorder graph or the daily gage readings. Records fair.

Daily discharge, in second-feet, of Fourmile Creek near Odessa, Oreg., for the year ending Sept. 30, 1917.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1		29	64	2.4	16		67	35	
2		30	64	2.4	17		72	34	
3		33	61	2.4	18		77	32	
4		36	61	2.2	19		80	28	
5		40	61	2.1	20		80	24	
6		42	61	1.8	21		80	18	
7		45		1.7	22		80	14	
8		49		1.6	23		83	11	
9		51			24		86	7.6	
10		57			25	29	93	6.8	
11		57	44		26	28	96	5.1	
12		58	42		27	27	96	4.7	
13		58	41		28	27	90	3.5	
14		60	38		29	27	86	3.1	
15		64	37		30	27	82	3.0	
					31	28		2.6	

NOTE.—Mean discharge, July 7–10 estimated as 52 second-feet.

Monthly discharge of Fourmile Creek at Fourmile Lake near Odessa, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 25–31	29	27	27.6	383
June	96	29	65.2	3,880
July	64	2.6	32.7	2,010
August 1–8	2.4	1.6	2.08	33
The period				6,310

NOTE.—Total run-off Oct. 1 to May 24 estimated as 2,900 acre-feet, the same as for the same dates in 1912–13, which was a year having similar characteristics of run-off; Aug. 9 to Sept. 30, flow very small total run-off for the year about 9,100 acre-feet.

A CANAL AT KLAMATH FALLS, OREG.

LOCATION.—In NW. ¼ sec. 29, T. 38 S., R. 9 E., at head of tunnel about one-fourth mile below head gates of canal and about a mile northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—Irrigation seasons, 1911–1917. Some water was diverted for three or four years prior to 1911, but no record was kept.

GAGE.—Stevens 8-day water-stage recorder on right of canal just above weir. Barrett & Lawrence recorder used prior to 1917.

DISCHARGE MEASUREMENTS.—Made from a foot plank just inside lower end of tunnel, about one-half mile below gage; rectangular section, 13.5 feet wide.

CHANNEL AND CONTROL.—Trapezoidal weir, 18.15 feet long, with its crest 7.27 feet above bottom of canal, which is a concrete-lined section 13.5 feet wide on the bottom, 12 feet deep, and with side slopes ½ to 1.

EXTREMES OF DISCHARGE.—Maximum stage during year from water stage recorder, 3.39 feet at 3 p. m. June 14 (discharge, 377 second-feet).

1911–1917: Maximum stage from recorder, 3.4 feet June 25, 1915 (discharge, 392 second-feet); minimum discharge, zero second-feet.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined by measurements made during 1915 and 1916. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspection of gage-height graph. Records excellent except those for May and September, which are good.

COOPERATION.—Data furnished by United States Reclamation Service.

This canal diverts water from Link River immediately below outlet of Upper Klamath Lake, in the NE. ¼ sec. 30, T. 38 S., R. 9 E., for irrigating lands east of Klamath River on both sides of Lost River. Most of the return waters reach Lost River.

Daily discharge, in second-feet, of A canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	77	299	310	46	16	.....	355	222	190	28
2	.....	90	250	326	32	17	.....	337	202	112	38
3	.....	90	187	310	31	18	.....	310	171	123	40
4	.....	103	172	286	36	19	.....	328	169	98	37
5	.....	130	229	304	44	20	.....	307	172	95	37
6	.....	196	275	297	31	21	.....	294	202	99	54
7	.....	232	313	291	30	22	10	299	202	87	61
8	.....	234	291	283	30	23	42	286	223	87	50
9	.....	256	278	202	30	24	15	283	234	77	43
10	.....	267	281	217	32	25	15	288	232	82	41
11	.....	286	272	210	37	26	21	288	235	83	30
12	.....	318	246	222	31	27	6	302	262	76	27
13	.....	345	236	222	28	28	0	324	278	47	42
14	.....	363	232	220	28	29	18	348	278	34	20
15	.....	363	228	211	28	30	36	345	278	34	.....
						31	52	.....	310	34	.....

NOTE.—Canal dry up to May 21 and on Sept. 30.

Monthly discharge of A canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 22-31	52	0	23.9	426
June	363	77	268	15,900
July	313	169	241	14,800
August	326	34	170	10,500
September 1-29	61	20	35.9	2,060
The period	.....	.....	.....	43,700

LOST RIVER ABOVE OLENE, OREG.

LOCATION.—In NW. ¼ sec. 21, T. 39 S., R. 11½ E., at old ford on Brotherton ranch in Poe Valley, about 5 miles east of Olene, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 22 to September 30, 1915; May 5 to September 30, 1916; July 25 to September 30, 1917. The discharge does not differ materially from that recorded at the station at Olene, 1907 to 1912.

GAGE.—Vertical staff on right bank; read by United States Reclamation Service employees. Gage datum bears no determined relation to those used in 1915 and 1916.

DISCHARGE MEASUREMENTS.—Made by wading; section rather poor.

CHANNEL AND CONTROL.—Channel of rock; control fairly permanent but has only slight fall; overhanging willows and growth of aquatic plants may affect stage-discharge relation somewhat.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 25 to September 30, 0.96 foot August 17 (discharge, 107 second-feet); minimum stage recorded, 0.67 foot July 27, August 11 and 12 (discharge, 77 second-feet). For maximum and minimum, 1904–1915, see "Lost River at Wilson Bridge," page 281

DIVERSIONS.—Some land is irrigated in Yonna Valley, a few miles above the station, and a large area by flooding in Langell Valley. Some return water reaches river from lands in Poe Valley irrigated from Link River.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve well defined. Gage read to hundredths nearly every day; some readings questionable. Daily discharge ascertained by applying daily gage readings to rating table. Records good.

COOPERATION.—Records furnished by United States Reclamation Service.

Discharge measurements of Lost River above Olene, Oreg., during the year ending Sept. 30, 1917.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 25	0.70	79
Aug. 21	.79	89

Daily discharge, in second-feet, of Lost River above Olene, Oreg., for the year ending Sept. 30, 1917.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		92	92	11		77	93	21		90	88
2		95	90	12		77	92	22		90	85
3		85	88	13		82	90	23		90	85
4		87	88	14		85	91	24		92	89
5		88	88	15		88	92	25	80	90	89
6		87	87	16		91	90	26	78	96	89
7		90	88	17		107	90	27	77	101	89
8		93	89	18		95	90	28	84	103	90
9		88	89	19		94	90	29	87	98	87
10		82	90	20		93	90	30	90	93	88
								31	92	92	

Monthly discharge of Lost River above Olene, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 25–31	92	77	84.0	1,170
August	107	77	90.7	5,580
September	93	85	89.2	5,310

LOST RIVER AT WILSON BRIDGE, NEAR OLENE, OREG.

LOCATION.—On line between secs. 29 and 30, T. 39 S., R. 10 E., at Wilson Bridge about one-fourth mile below diversion dam and 4 miles by river below Olene, Klamath County.

RECORDS AVAILABLE.—March 14, 1912, to September 30, 1917.

DRAINAGE AREA.—Not measured.

GAGE.—Vertical staff fastened to highway bridge. Zero of gage, 4,005.18 feet above sea level. Temporary gages used in 1917 but all readings reduced to datum of regular gage. Gage read by watchman for dam.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Gravel and chalk rock; clean and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 73.24 feet at 10 a. m. April 25 (discharge 2,920 second-feet); minimum discharge estimated as 3 second-feet (leakage through flashboards) November to March, inclusive.

1904–1916: Maximum stage recorded, 18.25 feet, mean for February 7, 1907, at Merrill station (discharge, 9,200 second-feet). The maximum stage for Olene station was 13.5 feet early in 1904, determined from high-water marks by John H. Lewis, May 24, 1904 (discharge, from partly developed rating curve, 8,600 second-feet). Minimum stage recorded for natural flow, 4.29 feet June 19, 1911, at Olene (discharge, 58 second-feet).

ICE.—Stage-discharge relation not affected by ice.

DIVERSIONS.—This station is just below the dam at which practically all the discharge of Lost River up to about 500 second-feet is diverted through the diversion canal into Klamath River or into the G canal on the east bank of the river.

REGULATION.—Changes in discharge covering several days may be caused at times by operation of the movable crest and outlet gates of the dam. Practically no water has ever reached this station from the area above the Clear Lake storage reservoir since June, 1909, when the dam was closed.

ACCURACY.—Stage-discharge relation changed about April 25, probably by sand filling in below gage on falling stage. Two fairly well defined rating curves used. Gage read to hundredths once daily while water was running. Daily discharge ascertained by applying daily gage height to rating table. Records only fair on account of diurnal fluctuations.

COOPERATION.—Field data furnished by United States Reclamation Service.

Discharge measurements of Lost River at Wilson Bridge, near Olene, Oreg., during the year ending Sept. 30, 1917.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 30	69.02	1,760
Apr. 10	69.99	1,980
25	73.24	2,920

Daily discharge, in second-feet, of Lost River at Wilson Bridge near Olene, Oreg., for the year ending Sept. 30, 1917.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	.....	1,680	546	11	.....	1,960	194	21	.....	1,350	.....
2	.....	1,520	519	12	.....	1,910	164	22	.....	1,750	.....
3	.....	1,580	499	13	.....	1,760	114	23	.....	2,160	.....
4	.....	1,830	492	14	.....	1,510	93	24	.....	2,440	.....
5	.....	1,890	422	15	.....	1,260	86	25	.....	2,890	.....
6	.....	2,050	316	16	.....	1,010	86	26	.....	2,480	.....
7	.....	2,310	279	17	.....	762	79	27	.....	2,220	.....
8	.....	2,430	272	18	.....	670	.....	28	.....	1,970	.....
9	.....	2,520	204	19	.....	547	.....	29	.....	1,340	.....
10	.....	2,020	209	20	.....	918	.....	30	1,760	709	.....
								31	1,860	.....	.....

Monthly discharge of Lost River at Wilson Bridge, near Olene, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October			a 5.0	307
November			a 3.0	179
December			a 3.0	184
January			a 3.0	184
February			a 3.0	167
March	1,860		120	7,380
April	2,890	547	1,710	102,000
May	546		150	9,220
June			a 6.0	357
July			a 6.0	369
August			a 6.0	369
September			a 6.0	357
The year	2,890		167	121,000

a Estimated leakage through flash boards of dam.

Monthly discharge of Lost River, Lost River diversion canal, and G canal, less Olene wasteway, for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	129	114	121	7,440
November	115	101	106	6,310
December	109		106	6,520
January	107	91	101	6,210
February	100	83	95.8	5,320
March	2,150	98	254	15,600
April	3,260	880	2,050	122,000
May	887	174	432	26,600
June	229	79	144	8,570
July	132	21	98.8	6,080
August a	107	77	90.7	5,580
September a	93	85	89.2	5,310
The year	3,260	21	306	222,000

a Taken from record above Olene.

TULE LAKE NEAR MERRILL, OREG.

LOCATION.—In sec. 8, T. 41 S., R. 11 E., at boat landing on J. F. Adams's ranch, half a mile south of ranch building and 3 miles east of Merrill, Klamath County.

RECORDS AVAILABLE.—May 17, 1904, to September 30, 1917.

GAGE.—Vertical staff or pile driven in bed of Lost River at a point which was formerly close to its mouth but is now nearly 2 miles from the open lake. Datum of gage, 4,043.93 feet above sea level since September 22, 1916; all readings reduced to a datum 4,000 feet above sea level. Several gages used prior to 1916; readings beginning October 1, 1912, refer to sea-level datum; earlier readings subject to some uncertainty of datum. Gage readers, employees of United States Reclamation Service.

EXTREMES OF STAGE.—Highest stage during year occurred in April; it was considerably higher than the true water surface of Tule Lake, because of high velocity and consequent slope of river. Minimum stage recorded, 1.20 feet, or 4,045.13 feet above sea level, September 29, 1917.

1904–1917: Maximum stage recorded, 11.35 feet April 30 and May 1, 1907, or 4,059.91 feet above sea level. Minimum stage recorded is that of 1917.

DIVERSION AND REGULATION.—No water has reached the mouth of Lost River from drainage area above Clear Lake Dam since June, 1909; since May 1, 1912, most of the discharge of Lost River up to 400 or 500 second-feet has been diverted at Lost River dam into Klamath River or through the "G" canal for irrigation.

COOPERATION.—Records furnished by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1											45.89	45.53
2							46.23		46.93			
3					45.59	45.81						
4							46.62		46.93			45.48
5										46.43		
6									46.92	46.38		
7												
8			45.49						46.88			
9		45.45									45.80	
10						45.87						45.40
11	45.63									46.32		45.40
12												
13				45.54						46.28		
14		45.44									45.71	
15												
15	45.48		45.49						46.85			
16					45.62	45.85						
18											45.65	
19								47.13		46.15		
20		45.43									45.62	45.26
21										46.11		
22												45.20
23			45.53								45.56	
24										46.02		
25												
26	45.45								46.58	46.01		
27				45.56								45.14
28												
29						45.89					45.58	45.13
30			45.53						46.47	45.95		
31								47.01		45.93		

MILLER CREEK NEAR LORELLA, OREG.

LOCATION.—In sec. 7, T. 40 S., R. 14 E., at site of an old wagon bridge about three-fourths mile above highway bridge, a mile east of Swingle ranch in Langell Valley, and 3 miles south of Lorella, Klamath County.

DRAINAGE AREA.—270 square miles.

RECORDS AVAILABLE.—April 1, 1909, to September 30, 1917; August 10, 1904, to December 1908, for a station in sec. 12, T. 39 S., R. 13 E., at the lower end of Horsefly Valley and 10 miles or more by creek above the present station. Only a small amount of inflow between the two points.

GAGE.—Friez water-stage recorder on left bank attached to old bridge abutment until April 25, when installation was washed out. Recorder installed temporarily on right bank opposite original location on April 26. Gage inspected by A. I. Brooks.

DISCHARGE MEASUREMENTS.—Made from highway bridge or, at low water, by wading; current is sluggish at the bridge, as the gradient of the stream is flat.

CHANNEL AND CONTROL.—Stream bed composed of rocks and gravel overlain with some silt; control fairly permanent; left bank subject to overflow in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.85 feet at 8 a. m. April 26 (discharge, 2,970 second-feet); minimum stage from water-stage recorder, 2.60 feet October 1–13 (creek probably dry or nearly so).

1904–1917: Maximum stage recorded, 14.0 feet February 5, 1907 (discharge, 6,730 second-feet).

ICE.—Stage-discharge relation apparently not materially affected by ice, as control remains open. Open-channel rating curve was formerly applied throughout the winter, but discharge for low winter stages in 1917 has not been computed.

DIVERSIONS.—A small irrigating flume, carrying about 1 second-foot, diverts water above the station.

REGULATION.—Flow may be occasionally affected by a rock and brush diversion dam just above gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined above 20 second-feet. Operation of water-stage recorder fairly satisfactory except for a few days in April and May. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Records fair.

COOPERATION.—Field data furnished by United States Reclamation Service, Klamath Project.

Discharge measurements of Miller Creek near Lorella, Oreg., during the year ending Sept. 30, 1917.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 16	5.28	454
24	8.44	2,630

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1917.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	13	50	735	17	16	.....	13	1,190	114	.....
2	.....	13	57	1,160	13	17	.....	13	582	92	.....
3	.....	13	50	672	9	18	.....	13	604	102	.....
4	.....	13	140	672	9	19	.....	13	672	114	.....
5	.....	13	410	604	9	20	.....	13	770	102	.....
6	.....	13	672	626	9	21	.....	13	1,120	72	.....
7	.....	13	1,000	626	9	22	.....	13	a1,600	293	.....
8	.....	13	1,330	604	9	23	.....	13	a2,070	280	.....
9	.....	13	1,030	a 558	9	24	.....	13	2,570	280	.....
10	.....	13	1,090	a 502	4	25	36	17	a2,770	140	.....
11	.....	13	1,940	a 446	4	26	13	13	2,970	34	.....
12	.....	13	1,000	393	.....	27	13	26	2,160	29	.....
13	.....	13	1,120	267	.....	28	13	92	1,260	29	.....
14	.....	13	1,000	190	.....	29	.....	114	a 932	29	.....
15	.....	13	649	177	.....	30	.....	50	604	34	.....
						31	.....	50	.....	22	.....

a Discharge interpolated.

NOTE.—Mean discharge estimated at 1.5 second-feet Feb. 1-24 and June 12-30. Discharge for periods October to January and July to September negligible.

Monthly discharge of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
February	36	.....	4.0	222
March	114	13	21.7	1,330
April	2,970	50	1,110	66,000
May	1,160	22	323	19,900
June	17	.....	4.3	256
The period	.....	.....	.....	87,700

OLENE WASTEWAY AT OLENE, OREG.

LOCATION.—In SW. ¼ sec. 14, T. 39 S., R. 10 E., at flume on F canal of Klamath project that crosses Lost River at Olene, Klamath County, about 4 miles upstream from Lost River dam.

RECORDS AVAILABLE.—Irrigation seasons, 1915 to 1917.

GAGE.—Records are kept of width of gate opening and of head of water on the orifice.

DISCHARGE MEASUREMENTS.—Made in flume above and below wasteway, and difference between the two measurements taken as outflow from wasteway.

ACCURACY.—Coefficient of discharge fairly well determined for discharge of 12 to 20 second-feet; somewhat uncertain outside of these limits. Gage and gate opening recorded to half-tenth once a day. Records for total yearly run-off fair.

COOPERATION.—Records furnished by United States Reclamation Service.

No current-meter measurements were made during the year.

The Olene wasteway is used to supply water from Link River to supplement the flow of Lost River when the latter is insufficient to supply the G canal. The records are used in obtaining the total natural flow of Lost River.

Daily discharge, in second-feet, of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1917.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1	.....	31	34	11	26	20	34	21	3	20	.....
2	.....	30	38	12	17	20	14	22	3	26	.....
3	.....	24	40	13	17	24	18	23	31	26	.....
4	.....	22	42	14	27	30	21	24	50	15	.....
5	.....	19	42	15	27	32	17	25	50	17	.....
6	.....	10	41	16	28	35	14	26	52	10	4
7	.....	10	42	17	18	20	14	27	52	4	4
8	.....	10	43	18	18	15	14	28	55	8	.....
9	.....	17	44	19	5	15	13	29	55	12	.....
10	3	22	49	20	16	15	10	30	31	12	.....
								31	.....	12	.....

Monthly discharge of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 10–30	55	3	27.8	1,160
July	35	4	18.8	1,160
August (22 days)	49	4	26.9	1,170
The period	.....	.....	.....	3,490

LOST RIVER DIVERSION CANAL NEAR KLAMATH FALLS, OREG.

LOCATION.—At corner of secs. 25 and 36, T. 39 S., R. 9 E., and secs. 30 and 31, T. 39 S., R. 10 E., at wagon bridge about 10 miles southeast of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1917.

GAGE.—Two Gurley 7-day recorders; No. 1 installed at wagon bridge at station 85; No. 2 at a wagon bridge at station 330, or about 5 miles below No. 1. Gage readings have been recorded to same datum, which is 4,080 feet above sea level. Gage read by employees of U. S. Reclamation Service. Gages above and below the intake gates at the Lost River dam,[1] in the SW. ¼ sec. 29, T. 39 S., R. 10 E., were read up to March 31, 1916, and openings of the three gates recorded.

[1] This station has been referred to as "Lost River diversion canal, near Olene."

DISCHARGE MEASUREMENTS.—Made from a footbridge near southeast corner of sec. 30, about a mile above gage No. 1, and about one-half mile below intake of canal.

CHANNEL AND CONTROL.—Artificial canal having a normal section about 50 feet wide on bottom, with side slopes 2 to 1, slope 0.00008, and designed to carry 4 to 5 feet depth of water. Klamath River backs water normally up to head of canal.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 390 second-feet March 30.

1912–1916: Maximum discharge recorded, 508 second-feet February 28, 1914, for openings of 5.5 feet on all three gates and a head of 0.85 foot. Canal dry at times.

ICE.—Stage-discharge relation unaffected by ice.

ACCURACY.—Stage-discharge relation affected by backwater from Klamath River. Daily discharge ascertained according to the method outlined in Water-Supply Paper 345–E.[1] Individual discharge measurements, unless proper corrections are made for the slope in the water surface at the time of each measurement, plot discordantly. When the discharge is corrected to correspond to that which would occur for an average slope, these measurements develop a rating curve, called the "normal curve." This normal rating curve has been used in the determination of daily flow, the discharge for any given day as determined from this curve being corrected to correspond to the slope in the water surface as obtained from the gage heights at gages Nos. 1 and 2. Normal rating curve is poorly defined. Water-stage recorders operated in a satisfactory manner except at gage No. 1, March 4–16, and at other times when operation of float may have been hampered by ice for short periods. Records fair.

COOPERATION.—Field data furnished by U. S. Reclamation Service.

Lost River diversion canal diverts water from Lost River into Klamath River to assist in lowering Tule Lake for the purpose of reclaiming the lake bed.

Discharge measurements of Lost River diversion canal near Klamath Falls, Oreg., during the year ending Sept. 30, 1917.

[Made by H. W. Humphrey.]

Date.	Gage height.		Discharge.	Date.	Gage height.		Discharge.
	Gage No. 1.	Gage No. 2.			Gage No. 1.	Gage No. 2.	
	Feet.	*Feet.*	*Sec.-ft.*		*Feet.*	*Feet.*	*Sec.-ft.*
Dec. 9	7.15	6.05	101	Apr. 10	8.98	7.32	357
Mar. 25	7.10	6.35	116	18	8.85	7.40	326
30	8.86	7.30	310	May 2	9.12	7.89	354
Apr. 4	8.87	7.22	327	24	8.50	7.65	183

[1] Hall, M. R., Hall, W. E., and Pierce, C. H., A method of determining the daily discharge of rivers of variable slope: U. S. Geol. Survey Water-Supply Paper 345, pp. 53–65, 1915.

Daily discharge, in second-feet, of Lost River diversion canal near Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	108	106	103	92	95	289	341	141
2	.....	108	106	102	92	96	329	341	150
3	.....	105	105	101	92	98	323	329	168
4	.....	103	105	101	92	.....	333	313	152
5	.....	103	.....	99	92	.....	339	320	101
6	.....	101	.....	99	92	.....	363	340	84
7	.....	98	.....	99	92	.....	362	340	88
8	.....	98	.....	99	96	.....	343	339	99
9	119	101	.....	99	96	.....	348	341	107
10	119	102	.....	99	97	.....	355	338	84
11	119	103	.....	99	97	.....	347	310	.....
12	119	112	.....	102	97	.....	356	314	.....
13	119	103	.....	104	97	.....	357	336	.....
14	119	100	.....	104	97	.....	314	331	.....
15	119	101	.....	104	97	.....	284	323	.....
16	119	99	.....	104	97	.....	284	316	.....
17	119	99	.....	104	96	110	304	313	.....
18	121	98	.....	102	97	112	318	278	.....
19	124	100	.....	100	97	114	333	277	.....
20	122	101	.....	99	89	114	341	283	.....
21	114	101	105	99	80	110	373	285	.....
22	111	103	105	97	82	114	363	255	.....
23	115	103	105	94	91	114	367	241	.....
24	118	103	105	94	86	115	367	214	.....
25	117	103	105	94	84	116	361	163	.....
26	111	105	104	94	94	133	343	149	.....
27	111	107	104	92	94	150	323	164	.....
28	110	106	103	88	94	282	305	172	.....
29	110	106	103	88	.....	368	348	174	.....
30	109	106	103	89	.....	348	317	150	.....
31	109	.....	103	92	.....	293	.....	123	.....

NOTE.—Mean discharge Dec. 5–20, estimated 101 second-feet; Mar. 4–16, 100 second-feet.

Monthly discharge of Lost River diversion canal, near Klamath Falls, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	124	109	a 116	7,130
November	112	98	103	6,130
December	106	.....	103	6,330
January	104	88	98.2	6,040
February	97	80	92.8	5,150
March	368	95	135	8,300
April	373	284	336	20,000
May	341	123	275	16,900
June 1–10	168	84	117	2,320
The period	.....	.....	.....	78,300

a Mean for 23 days taken as mean for month.

G CANAL NEAR OLENE, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 39 S., R. 10 E., at intake at east end of Lost River dam, 4 miles south of Olene, Klamath County.

RECORDS AVAILABLE.—Irrigating seasons, 1912 to 1917.

GAGE.—Stevens 8-day water-stage recorder 200 feet below the intake.

DISCHARGE MEASUREMENTS.—Made from wagon bridge 1,500 feet below intake.

CHANNEL AND CONTROL.—Canal is of regular section, 16 feet wide on the bottom and practically permanent. Control not well defined; timber check at station 112 was not operated in 1917 to any considerable extent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during irrigating season, May 24 to September 29, 4.19 feet August 4 (discharge, 125 second-feet); maximum discharge, 159 second-feet at 4 p. m. June 16 (gage height, 3.94 feet). Minimum stage, 1.00 foot May 25 to 28 (discharge, 23 second-feet); minimum discharge, 15 second-feet September 29 (gage height, 2.00 feet).

ACCURACY.—Stage-discharge relation not permanent, being affected somewhat by operation of check, but mostly by growth of aquatic plants. Rating curve well defined and used May 24 to June 12. Daily discharge ascertained by indirect method for shifting control. Operation of recorder satisfactory except June 16–29, July 27–31, and August 18–31, when one reading daily on staff gage was used. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the recorder graph. Records fair.

COOPERATION.—Field data and computations by United States Reclamation Service, Klamath project, J. B. Bond, project manager.

G canal diverts water from Lost River in the SW. ¼ sec. 29, T. 39 S., R. 10 E., and irrigates land east of the lower part of the river and north of Tule Lake. Return waters reach both the river and the lake.

Discharge measurements of G canal near Olene, Oreg., during the year ending Sept. 30, 1917.

[Made by H. W. Humphrey.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 25	1.00	22.6	July 6	4.00	136	Aug. 27	3.02	53
June 2	1.66	46.0	20	3.57	99	30	2.58	34.8
12	3.46	134	31	3.96	113	Sept. 20	2.58	31.4
July 2	4.02	146	Aug. 13	3.73	100			

Daily discharge, in second-feet, of G canal near Olene, Oreg., for the year ending Sept. 30, 1917.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	44	145	109	41	16	.....	157	50	96	32
2	.....	45	145	123	44	17	.....	152	100	94	32
3	.....	47	145	125	42	18	.....	146	102	94	32
4	.....	61	143	125	53	19	.....	143	100	84	31
5	.....	73	140	110	39	20	.....	142	100	106	31
6	.....	83	136	107	34	21	.....	139	98	66	31
7	.....	103	134	115	34	22	.....	135	94	80	30
8	.....	113	129	114	34	23	.....	134	96	67	30
9	.....	116	128	112	34	24	23	133	100	73	30
10	.....	108	126	112	33	25	23	132	102	86	30
11	.....	126	126	107	33	26	23	131	98	85	30
12	.....	132	124	104	33	27	23	129	96	78	30
13	.....	138	110	100	33	28	23	128	102	77	30
14	.....	141	110	100	32	29	25	138	106	33	15
15	.....	149	54	98	32	30	42	146	110	34	.....
						31	45	.....	110	29	.....

NOTE.—Canal dry Oct. 1 to May 23 and Sept. 30.

Monthly discharge of G canal near Olene, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May (8 days)	45	23	28.4	451
June	157	44	119	7,080
July	145	50	112	6,890
August	125	29	91.7	5,640
September (29 days)	53	15	33.3	1,920
The period				22,000

LOWER KLAMATH LAKE NEAR MOUNT DOME,[1] CALIF.

LOCATION.—In sec. 35, T. 47 N., R. 2 E., at Laird's landing, at extreme south end of Lower Klamath Lake, about 6 miles southeast of Brownell, Siskiyou County.

RECORDS AVAILABLE.—January 23, 1907, to July 15, 1909; August 1, 1912, to September 30, 1916.

GAGE.—Vertical staff on northeast bend of wharf; datum, 4,083.18 feet above sea level; August 1, 1912, to August 14, 1915, datum 4,085 feet. Gage reader, Lawrence Laird. Gage used 1907 to 1909, in sec. 35; datum, 4,082.50 feet above sea level

EXTREMES OF STAGE.—1907–1909 and 1912–1916: Maximum stage recorded, 2.4 feet, or 4,087.4 feet above sea level, April 28–29, 1914. Minimum stage recorded, 4,084.10 feet September 10–22, 1908.

COOPERATION.—Record furnished by United States Reclamation Service, Klamath Project.

Daily gage height, in feet, of Lower Klamath Lake near Mount Dome, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.00	2.05	2.10	2.50	2.65	2.75	2.60	3.40	3.50	3.00	2.10	1.75
2	1.90	2.10	.....	2.55	2.65	2.75	2.60	3.50	3.50	2.90	2.20	.....
3	2.10	2.10	.....	2.50	2.65	2.75	2.60	3.50	3.40	2.90	2.10	1.70
4	2.00	.....	2.10	2.50	2.55	2.75	2.50	3.55	3.50	2.95	2.10	1.70
5	1.90	2.05	.....	2.50	2.55	2.75	2.55	3.60	3.50	2.85	2.10	1.60
6	2.00	2.05	.....	2.50	2.55	2.75	2.50	.....	3.45	2.90	2.00	1.40
7	1.90	2.10	2.20	2.50	2.55	2.75	2.55	.....	3.45	2.90	2.00	1.40
8	1.90	2.10	2.30	2.50	2.55	2.75	2.55	3.60	3.50	2.90	2.00	1.50
9	1.90	2.00	2.40	2.55	2.55	2.75	2.50	3.60	3.45	2.90	2.00	1.40
10	2.00	2.10	2.40	2.50	2.55	2.75	2.50	3.60	3.40	2.85	1.90	1.40
11	2.00	2.10	2.40	2.55	2.55	2.75	2.55	3.50	3.45	2.90	1.90	1.40
12	1.90	2.10	2.45	2.60	2.60	2.75	2.50	3.40	3.40	2.85	1.90	1.50
13	2.00	2.20	2.40	2.60	2.65	2.75	2.60	3.50	3.35	2.80	1.90	1.50
14	2.00	2.25	2.40	2.60	2.65	2.75	2.60	3.40	3.40	2.75	1.85	1.50
15	2.00	2.20	2.40	2.65	2.65	2.75	2.50	3.50	3.40	2.70	1.85	1.50
16	2.10	2.20	2.40	2.60	2.60	2.75	2.55	3.50	3.20	2.60	1.85	1.30
17	2.00	2.20	2.40	2.60	2.65	2.75	2.65	3.60	3.20	2.60	1.80	1.30
18	2.10	2.20	2.40	2.65	2.65	2.80	2.70	3.60	3.30	2.55	1.80	1.30
19	2.00	2.20	2.50	2.65	2.60	2.80	2.70	3.50	3.20	2.55	1.89	1.30
20	2.00	2.20	2.40	2.65	2.60	2.80	2.60	3.50	3.20	2.50	1.80	1.50
21	2.00	2.20	2.40	2.65	2.60	2.85	2.65	3.40	3.15	2.50	1.80	1.50
22	2.10	2.20	2.45	2.60	2.60	2.85	2.70	3.50	3.20	2.50	1.80	1.50
23	2.00	2.20	2.50	2.65	2.65	2.90	2.80	3.40	3.20	2.40	1.80	1.50
24	2.10	2.25	2.50	2.65	2.70	2.90	2.90	3.40	3.20	2.30	1.75	1.60
25	2.10	2.15	2.50	2.65	2.70	2.75	2.90	3.40	3.20	2.30	1.75	1.60
26	2.15	2.30	2.45	2.60	2.75	2.75	3.00	3.40	3.10	.....	1.75	1.60
27	2.10	2.20	2.50	2.65	2.75	2.60	3.10	3.40	3.10	2.20	1.75	1.60
28	2.10	2.20	2.50	2.70	2.75	2.50	3.20	3.40	3.05	2.20	1.80	1.60
29	2.10	.....	2.50	2.65	.....	2.60	3.20	3.40	3.00	2.20	1.80	1.60
30	2.15	2.15	2.50	2.65	.....	2.60	3.30	3.40	3.00	2.20	1.80	1.60
31	2.10	.....	2.45	2.70	.....	2.60	.....	3.45	.....	2.20	1.75	.....

[1] Formerly published as near Brownell, Calif.

BEAVER CREEK NEAR LILYGLEN, OREG.

LOCATION.—In SW. ¼ sec. 32, T. 38 S., R. 4 E., one-eighth mile above Klum Creek, 6 miles southeast of former post office of Lilyglen, and 22 miles east of Ashland, Jackson County.

DRAINAGE AREA.—About 22 square miles (measured on maps of United States Reclamation Service).

RECORDS AVAILABLE.—April 23 to June 14, 1916; October 21, 1916, to July 5, 1917.

GAGE.—Stevens 8-day recorder on left bank at same location as vertical staff used in 1916; datum 2.0 feet higher. Gage tended by Fred Lindsay.

DISCHARGE MEASUREMENT.—Made by wading, or from footbridge.

CHANNEL AND CONTROL.—Stream bed of silt and clay; current sluggish; probably will not shift materially.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded, 2.42 feet at 9 p. m. May 12 (discharge, 470 second-feet); minimum stage recorded, 0.44 foot July 24 (stream dry).

ICE.—Stage-discharge relation affected by ice November 11 to April 16. Discharge March 1 to April 16, estimated.

DIVERSIONS.—A little water is diverted above the station for irrigating meadows and watering stock.

ACCURACY.—Stage-discharge relation practically permanent; rating curve well defined. Operation of water-stage recorder satisfactory beginning April 4. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph. Records good April 17 to June 30; others poor.

Discharge measurements of Beaver Creek near Lilyglen, Oreg., during the year ending Sept. 30, 1917.

[Made by F. C. Dillard.]

Date.	Gage height.[a]	Discharge.
	Feet.	*Sec.-ft.*
Oct. 21	0.47	0.4
May 11	1.88	206

[a] Datum of gage 2 feet higher than in 1916.

Daily discharge, in second-feet, of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1	.....	124	129	8	16	.....	215	31	.....
2	.....	137	121	7	17	137	250	27	.....
3	.....	154	106	6	18	101	206	26	.....
4	.....	154	95	6	19	81	186	22	.....
5	.....	157	84	6	20	81	198	20	.....
6	.....	190	77	.....	21	84	170	17	.....
7	.....	225	75	.....	22	118	160	16	.....
8	.....	190	74	.....	23	182	150	15	.....
9	.....	202	75	.....	24	240	144	14	.....
10	.....	186	74	.....	25	220	137	13	.....
11	.....	230	63	.....	26	270	113	11	.....
12	.....	310	53	.....	27	275	115	10	.....
13	.....	350	43	.....	28	240	121	9	.....
14	.....	305	39	.....	29	167	132	9	.....
15	.....	300	35	.....	30	129	134	8	.....
					31	.....	132	.....	.....

NOTE.—Creek frozen solid during winter and stage-discharge relation apparently affected by ice until Apr. 6. No estimates prior to Mar. 1. Discharge estimated on basis of observer's notes and temperature records as follows: Mar. 1–25, 5 second-feet; Mar. 26–31, 50 second-feet; Apr. 1–5, 100 second-feet; Apr. 6–10, 120 second-feet; Apr. 11–16, 140 second-feet.

Monthly discharge of Beaver Creek near Lilyglen, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March			13.7	842
April	275		142	8,450
May	350	113	186	11,400
June	129	8	46.4	2,760
July	8	0	[a] 2.0	123
The period				23,600

[a] Estimated.

KEENE CREEK NEAR ASHLAND, OREG.

LOCATION.—In SW. ¼ sec. 16, T. 39 S., R. 3 E., near proposed dam site about 3 miles north of Green Spring Mountain road from Ashland to Klamath Falls and 20 miles from Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1 to July 31, 1917; miscellaneous measurements in 1916.

GAGE.—Stevens recorder Type A, on right bank 100 feet above proposed dam site. Inspected by Fred Lindsay.

DISCHARGE MEASUREMENTS.—Made by wading, or from footbridge.

CHANNEL AND CONTROL.—Sand and clay; may shift in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, channel unobstructed, 4.08 feet at 5 p. m. April 25 (discharge, 194 second-feet.) Creek channel practically dry at times during the winter, and beginning about July 22.

ICE.—Stage-discharge relation affected by ice from about November 21 to April 25.

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of recorder satisfactory except April 5–21, but interpretation of record, November 21 to April 25, not possible because of ice. Flow very small up to November 21; recorder did not operate after July 22. Daily discharge ascertained by means of discharge integrator, April 25 to May 20; by applying to rating table the mean gage height obtained by inspecting recorder graph, May 21 to July 22. Records good May to July; poor for April.

Discharge measurements of Keene Creek near Ashland, Oreg., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	F. C. Dillard	0.45	0.1	May 24	F. C. Dillard	2.61	56
May 2	do	2.72	[a] 72	June 18	Dillard and Batchelder	2.12	31.2
8	do	3.30	113	July 2	F. C. Dillard	.94	3.5
21	do	2.70	65				

[a] Measured about a mile below gage. Inflow estimated as 5 second-feet and has been deducted from measurement.

Daily discharge, in second-feet, of Keene Creek near Ashland, Oreg., for the year ending Sept. 30, 1917.

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1	.....	52	99	4.0	11	.....	116	67	0.7	21	.....	66	22	0.1
2	.....	56	93	3.4	12	.....	127	56	.6	22	.....	66	20	.....
3	.....	68	85	3.1	13	.....	134	47	.4	23	.....	65	17	.....
4	.....	77	79	2.6	14	.....	118	42	.3	24	.....	60	15	.....
5	.....	80	76	2.3	15	.....	113	38	.3	25	158	55	13	.....
6	.....	98	73	2.0	16	.....	88	34	.2	26	135	63	11	.....
7	.....	100	74	1.6	17	.....	93	33	.2	27	111	77	9	.....
8	.....	102	76	1.3	18	.....	78	31	.2	28	96	87	7	.....
9	.....	97	84	1.0	19	.....	78	27	.2	29	78	98	5.8	.....
10	.....	107	77	.8	20	.....	71	25	.1	30	57	100	4.7	.....
										31	.....	100	.....	.....

NOTE.—Mean discharge estimated because of ice as follows: Apr. 1-5, 1 second-foot; Apr. 6-15, 30 second-feet; Apr. 16-20, 50 second-feet; Apr. 21-24, 120 second-feet. Discharge prior to Apr. 1 very small, probably less than 1 second-foot at any time. Estimated at zero discharge July 22-31.

Monthly discharge of Keene Creek near Ashland, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
April	.....	.....	55.7	3,310
May	134	52	86.8	5,340
June	99	4.7	44.7	2,660
July	4.0	0	.82	49
The period	.....	.....	.....	11,400

SHASTA RIVER NEAR MONTAGUE, CALIF.

LOCATION.—In N. ½ NE. ¼ sec. 33, T. 45 N., R. 6 W., at highway bridge 1¼ miles southwest of Montague, Siskiyou County. Little Shasta River enters 1 mile above and Yreka Creek 5½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1911, to September 30, 1913; September 20, 1916, to September 30, 1917.

GAGE.—Vertical staff in two sections; lower section fastened to bridge pier on right bank; upper section to left abutment. Several changes in gage section have been made but original datum has been maintained. Gage read by H. W. Cherry and Domingus Lucas.

DISCHARGE MEASUREMENTS.—Made from highway bridge, or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent. Banks subject to overflow during very high water.

EXTREMES OF DISCHARGE.—Record for period of maximum flow unreliable (discharge unknown); minimum stage recorded during year, 2.6 feet July 30, 31, August 12, 13, and 16 (discharge, 25 second-feet).

1911–1917: Maximum stage recorded, 4.3 feet at 9 a. m. January 19, 1913 (discharge, 712 second-feet); minimum stage recorded, 2.6 feet July 30, 31, August 12, 13, and 16, 1917 (discharge, 25 second-feet).

DIVERSIONS.—The Dwinnell ditch diverts about 30 second-feet 2 miles above gage. The Grenada ditch diverts about 40 second-feet 12 miles above gage. Other small ditches divert above gage. The water is used for irrigation in vicinity of Mayten and Grenada..

REGULATION.—Considerable diurnal fluctuation at the gage due to irrigation above. The water diverted for irrigation probably returns to river above the gage by seepage.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 25 and 400 second-feet and extended above. Gage read to half-tenths twice daily from October 1 to January 20 and to tenths once daily from April 1 to September 30; record, February 1 to March 31, unreliable. Daily discharge ascertained by applying mean daily gage height to rating table. Records good October 1 to January 20 and fair from April 1 to September 30.

Discharge measurements of Shasta River near Montague, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	J. F. Kunesh	3.30	149	Apr. 22	J. F. Kunesh	3.60	237
26	do	3.30	150	May 23	do	3.40	176
31	do	3.37	155	23	do	3.40	178
31	do	3.38	165	July 12	McGlashan and Kunesh	2.73	38
Mar. 14	do	3.60	242	Sept. 15	J. F. Kunesh	3.03	86
14	do	3.60	245				

Daily discharge, in second-feet, of Shasta River near Montague, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	124	163	207	201	.....	224	163	149	48	35	35
2	111	163	233	207	.....	224	192	149	48	48	48
3	111	171	307	214	.....	224	87	224	48	35	48
4	111	171	335	240	.....	224	135	135	48	56	65
5	111	177	307	224	.....	258	87	135	48	35	48
6	111	177	270	233	.....	258	111	111	48	48	35
7	111	177	240	240	.....	258	87	87	35	65	35
8	157	171	207	240	.....	224	111	111	48	48	48
9	149	177	224	233	.....	192	65	111	48	48	48
10	135	171	224	214	.....	192	87	192	48	48	48
11	135	163	224	233	.....	465	111	135	48	48	35
12	135	177	224	224	.....	335	192	111	35	25	48
13	135	177	224	233	.....	296	48	111	35	25	48
14	135	177	207	214	244	258	48	111	35	35	48
15	135	183	201	201	.....	224	375	135	83	35	65
16	149	192	201	177	.....	224	335	111	48	25	48
17	163	192	192	177	.....	258	335	35	48	35	48
18	149	192	192	177	.....	192	335	65	35	65	65
19	149	192	201	177	.....	224	258	48	35	48	65
20	149	201	207	177	.....	135	224	65	35	48	65
21	149	192	207	.....	.....	135	192	65	35	48	65
22	149	192	207	.....	.....	192	192	48	35	35	83
23	149	192	207	.....	.....	296	177	35	35	35	104
24	149	192	214	.....	.....	296	192	83	35	35	126
25	149	207	207	.....	.....	335	163	83	35	35	115
26	149	214	201	.....	.....	335	135	65	48	35	126
27	149	214	192	.....	.....	258	135	35	35	48	126
28	149	207	192	.....	.....	258	224	35	25	35	149
29	149	207	177	.....	.....	258	163	48	35	35	149
30	149	207	201	.....	.....	192	177	65	25	48	149
31	171	.....	207	.....	.....	.....	163	.....	25	48	.....

NOTE.—No gage-height record Jan. 21-31; record, Feb. 1 to Mar. 31, unreliable; no determination of discharge.

Monthly discharge of Shasta River near Montague, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	171	111	140	8,610
November	214	163	186	11,100
December	335	177	221	13,600
January 1-20	240	177	212	8,410
April	465	135	248	14,800
May	375	48	171	10,500
June	224	35	96.4	5,740
July	83	25	41.0	2,520
August	65	25	41.7	2,560
September	149	35	72.8	4,330

EAST FORK OF SCOTT RIVER AT CALLAHAN, CAL.

LOCATION.—In SW. ¼ SW. ¼ sec. 16, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge at Callahan, Siskiyou County, 800 feet above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1913, to September 30, 1917 (fragmentary).

GAGE.—Staff in two sections on left bank; lower section, inclined, is fastened to cottonwood tree 10 feet above bridge; upper section, vertical, is fastened to left abutment of bridge; read by F. H. Williams and N. M. Hayden.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and small gravel; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 8 a. m. May 12 (discharge, 293 second-feet); minimum stage recorded, 4.9 feet August 31 and September 8 (discharge, 3.0 second-feet).

1913–1917: Maximum stage recorded, 8.0 feet at 2 p. m. March 19, 1916 (discharge, from extension of rating curve, about 1,200 second-feet); minimum stage recorded, 4.9 feet August 31 and September 8, 1917 (discharge, 3.0 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 15 second-feet and between 110 and 210 second-feet; rest of curve has been drawn by estimation. Gage read to hundredths occasionally. Daily discharge ascertained by applying daily gage height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of East Fork of Scott River at Callahan, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	J. F. Kunesh	5.21	9.8	May 22	J. F. Kunesh	6.05	120
27	do	5.21	11	July 14	McGlashan and Kunesh	5.22	11
Apr. 24	do	6.27	186	Sept. 16	J. F. Kunesh	5.01	4.3
May 22	do	6.05	127				

Daily discharge, in second-feet, of East Fork of Scott River at Callahan, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1					134			6	
2		11							
3				62					
4			28		160	134			
5			22				18	6	
6						160			
7				67	189				
8			18						3.0
9		13						6	
10									
11	9.5		15						
12				54	293				
13						89			
14							11		
15								4.6	
16		14		50					5.0
17						30			
18				48					
19									
20				67					
21							7		
22		14			122	54			
23				147					
24				180		30	6	3.8	
25				189					
26									
27	11						6		
28				174					
29			14						
30		15							
31					220			3.0	

NOTE.—No gage-height record on days for which discharge is not given.

SCOTT RIVER AT CALLAHAN, CALIF.

LOCATION.—In NE. ¼ sec. 17, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge three-fourths of a mile below junction of East and South forks, 1 mile northwest of Callahan, Siskiyou County. Wildcat Creek enters 500 feet above and Sugar Creek 1½ miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 12, 1911, to September 30, 1917 (fragmentary).

GAGE.—Vertical staff in two sections on right bank; installed November 14, 1912. Original gage was just above power house, about 2,000 feet above present site. Present gage installed at independent datum which was raised 0.97[1] foot June 26, 1914. Gage read by F. H. Williams and N. M. Hayden.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage, or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.7 feet at 5 p. m. May 7 (discharge, 550 second-feet); minimum stage recorded, 0.74 foot at 3 p. m. September 16 (discharge, 12 second-feet).

1911–1917: Maximum stage recorded, 3.4 feet at 11.30 a. m. June 6, 1915 (discharge, 885 second-feet); minimum stage recorded, 2.0 feet (old datum) September 25 and 28, 1913 (discharge, 11 second-feet).

DIVERSION.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read to hundredths occasionally. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

[1] Figure published in previous reports is in error.

Discharge measurements of Scott River at Callahan, Calif., during the year ending Sept. 30, 1917.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	J. F. Kunesh	0.90	19	July 14	McGlashan and Kunesh	1.21	49
27	do	.90	20	23	S. C. Whipple	1.00	30
Apr. 24	do	2.21	331	Sept. 16	J. F. Kunesh	.74	12
May 22	do	2.10	298				

Daily discharge, in second-feet, of Scott River at Callahan, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1					306			22	
2									
3				220					
4					365	365			
5			36				137	20	
6						365			
7				253	550				
8			29						12
9		29						20	
10	29								
11			29						
12				190	452				
13						253			
14							59		
15			29					17	
16		29		150					12
17						325			
18				137					
19									
20				176					
21							74		
22		36			288	253			
23				288			29		
24				325		220	24	14	
25				386					
26									
27	20						22		
28				365					
29						137			
30									
31					407			12	

NOTE.—No gage-height record on days for which discharge is not given.

INDIAN CREEK NEAR HAPPY CAMP, CALIF.

LOCATION.—In the NW. ¼ sec. 22, T. 17 N., R. 7 E., in Klamath National Forest, at highway bridge at Roberts ranch, about 4¾ miles north of Happy Camp, Siskiyou County, and junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1917 (fragmentary).

GAGE.—Staff in three sections installed at bridge, November 20, 1912. Section No. 1, vertical, is fastened to stump on right bank 2 feet above bridge; No. 2, vertical, is fastened to right abutment of bridge near downstream end; No. 3, inclined, is fastened to alder tree on left bank 12 feet below bridge. Original gage was vertical staff fastened to alder tree on left bank about 700 feet above bridge at an independent datum. Gage read by M. M. Morgan.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; permanent.

EXTREMES OF DISCHARGE.—1911–1917: Maximum stage recorded, 10.6 feet February 17, 1912 (discharge, from extension of rating curve, about 8,430 second-feet); minimum stage recorded, 2.5 feet August 19 to September 6, 1914 (discharge, 20 second-feet).

DIVERSIONS.—The Reeve Davis Consolidated Mining Co.'s ditch diverts water above and returns it to the stream below the station, but none was diverted this year; other small ditches use water for mining.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 35 and 2,500 second-feet. Gage read to half-tenths occasionally. Daily discharge ascertained by applying daily gage height to rating table.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Indian Creek near Happy Camp, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	2.81	51	May 21	4.93	650
29	2.81	48	Sept. 18	2.84	49
May 21	4.95	681			

Daily discharge, in second-feet, of Indian Creek near Happy Camp, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Dec.	Feb.	Mar.	Apr.	May.	June.	Sept.
1	57	142						
2				430	605			
3								
4					555			
5								
6		295		295			790	
7								
8			235					
9		168						
10								
11		130	250					
12								
13								
14								
15					720			
16					605			
17				235				
18								51
19								
20								
21		180				690		
22		168					430	47
23			265					
24	42							
25								
26			430	412				
27								
28								
29	47							
30					945			
31								

NOTE.—Gage not read on days for which discharge is not given.

TRINITY RIVER AT LEWISTON, CALIF.

LOCATION.—In NE. ¼ sec. 19, T. 33 N., R. 8 W., at highway bridge at Lewiston, Trinity County, about 9 miles below Stewarts Fork. Indian Creek enters 6 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 28, 1911, to September 30, 1917.

GAGE.—Vertical staff in two sections on left bank at bridge; lower section fastened to pile 10 feet above bridge; upper section fastened to downstream end of bridge abutment. Gage read by W. W. Phillips.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; apparently permanent. Banks subject to overflow at extreme high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.1 feet at 7 a. m. February 25 (discharge, 10,600 second-feet); minimum stage recorded, 2.0 feet at 5.30 a. m. September 21 (discharge, 85 second-feet).

1911–1917: Maximum stage recorded, 16.7 feet at 12.30 p. m. January 2, 1914 (discharge from extension of rating curve, about 26,900 second-feet); minimum stage recorded, 2.0 feet at 5.30 a. m. September 21, 1917 (discharge, 85 second-feet).

DIVERSIONS.—Water is diverted above the station for irrigation, placer mining, and power development.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 85 and 8,000 second-feet, fairly well defined below, and extended above. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except those for very high water, which are probably good.

Discharge measurements of Trinity River at Lewiston, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 24	2.32	164	Sept. 8	2.09	104
24	2.32	168	8	2.08	99

Daily discharge, in second-feet, of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	150	150	360	205	338	1,390	1,220	2,470	3,250	668	150	108
2	150	150	545	240	360	1,020	1,220	2,230	2,990	668	145	104
3	150	150	668	258	315	942	1,220	2,350	2,860	635	145	114
4	162	150	700	275	315	870	1,300	2,230	2,600	635	130	108
5	175	190	635	275	315	870	1,780	2,990	2,600	575	138	100
6	175	175	605	315	338	765	2,110	3,660	2,730	575	125	100
7	175	240	435	315	385	765	2,230	4,540	3,120	515	125	100
8	175	205	385	315	410	700	2,730	3,800	3,380	460	125	100
9	175	222	315	275	410	700	2,110	3,520	3,520	410	125	104
10	175	205	295	275	385	700	1,780	3,520	2,730	360	125	104
11	175	205	275	275	360	635	2,990	4,090	2,110	315	125	104
12	175	205	275	275	515	635	2,860	4,090	1,680	324	114	104
13	175	205	275	258	515	635	2,230	5,000	1,580	315	114	104
14	175	190	258	258	488	575	1,890	4,390	1,780	315	114	104
15	175	175	258	315	515	575	1,680	3,520	1,890	307	114	108
16	175	175	240	275	545	545	1,780	2,860	2,000	283	114	104
17	175	175	240	338	515	575	1,390	2,600	1,890	295	114	104
18	175	175	240	315	545	575	1,140	2,470	1,680	295	114	104
19	175	175	222	315	515	635	1,060	2,470	1,780	268	104	100
20	150	175	240	295	515	700	1,060	2,230	1,580	258	108	94
21	150	175	258	315	545	732	1,300	2,470	1,390	205	104	89
22	150	175	275	385	732	732	2,000	2,730	1,220	199	104	104
23	150	175	275	385	668	700	2,600	2,860	1,060	181	100	108
24	150	175	275	385	3,800	700	3,520	2,990	1,060	181	94	108
25	150	190	275	315	8,250	765	4,390	2,730	905	175	100	114
26	150	258	240	275	2,990	835	4,390	2,730	905	175	100	104
27	150	315	258	275	1,780	1,060	3,800	2,860	835	155	94	104
28	150	295	240	315	1,580	1,780	3,520	3,250	835	155	104	104
29	150	295	222	488	.....	2,230	3,120	3,800	765	150	121	100
30	150	295	222	460	.....	1,780	2,860	4,390	732	150	125	100
31	150	.....	222	360	.....	1,480	.....	3,800	.....	150	121	.....

Monthly discharge of Trinity River at Lewiston, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	175	150	162	9,960
November	315	150	201	12,000
December	700	222	330	20,300
January	488	205	310	19,100
February	8,250	315	1,030	57,200
March	2,230	545	890	54,700
April	4,390	1,060	2,240	133,000
May	5,000	2,230	3,210	197,000
June	3,520	732	1,920	114,000
July	668	150	334	20,500
August	150	94	117	7,190
September	114	89	104	6,190
The year	8,250	89	901	651,000

TRINITY RIVER AT HOOPA, CALIF.

LOCATION.—In NW. ¼ sec. 25, T. 8 N., R. 4 E., at Hoopa Indian Agency, Humboldt County, about 1 mile above Hoopa Ferry and 11 miles above junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1911, to December 7. 1914; October 8, 1916, to September 30, 1917 (incomplete).

GAGE.—Staff in four sections on left bank 800 feet above mouth of Supply Creek; read twice a day by Newell and Brown. Original location and datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from ferry cable 1 mile below gage. As Supply Creek enters between gage and ferry, it is necessary to deduct discharge of this stream from measurements made at ferry to obtain flow at gage.

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.6 feet at 8.30 a. m. February 25 (discharge, from extension of rating curve, about 71,200 second-feet); minimum stage recorded, 4.5 feet September 17–22 (discharge, 370 second-feet).

1911–1917: Maximum stage recorded, 28.1 feet at 5 p. m. December 31, 1913 (discharge, from extension of rating curve, about 89,000 second-feet); minimum stage recorded September 17–22, 1917.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 25. Rating curves before and after change well defined below 1,300 second-feet, fairly well defined between 1,300 and 16,000 second-feet, and extended above. Curves identical above 2,400 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Indian service.

Discharge measurements of Trinity River at Hoopa, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	4.96	516	Oct. 9	4.97	527	June 16	8.47	4,640
9	4.97	524	June 16	8.45	4,590	Aug. 27	4.73	467

Daily discharge, in second-feet, of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	545	1,340	1,440	1,340	16,400	11,700	12,600	.....	.....	720	432
2	.....	545	1,760	1,880	1,340	13,200	11,400	12,600	.....	2,250	720	432
3	.....	545	2,910	1,760	2,000	10,800	11,100	13,200	.....	2,500	660	432
4	.....	605	4,120	1,340	2,370	7,900	9,740	13,800	.....	2,370	660	410
5	.....	805	3,960	2,770	2,770	7,160	9,200	13,200	.....	2,500	605	410
6	.....	970	3,960	2,000	3,050	6,920	9,200	12,600	.....	2,370	605	410
7	545	1,060	3,050	1,540	3,800	6,690	8,930	12,300	.....	2,130	605	410
8	515	885	2,240	1,190	3,960	6,240	.....	12,000	.....	2,010	605	410
9	515	845	1,760	928	3,960	6,240	.....	11,100	.....	1,900	605	410
10	515	805	2,000	805	3,960	6,020	.....	11,100	.....	1,680	605	410
11	515	770	1,760	770	3,960	6,020	.....	10,800	.....	1,570	578	410
12	515	770	1,760	735	3,960	6,020	.....	11,400	.....	1,470	550	410
13	515	770	1,660	702	3,960	5,810	.....	.....	.....	1,380	525	410
14	515	770	1,660	670	3,960	5,810	.....	.....	.....	1,380	525	410
15	515	770	1,540	638	3,800	5,600	.....	.....	.....	1,280	500	410
16	485	735	1,540	605	3,800	5,400	.....	.....	4,820	1,280	500	410
17	485	702	1,340	605	3,960	5,400	.....	.....	.....	1,280	500	370
18	485	670	1,760	545	4,640	6,690	.....	.....	.....	1,280	500	370
19	485	670	1,340	545	5,200	6,920	.....	.....	.....	1,230	500	370
20	485	670	1,100	2,500	4,640	7,650	.....	8,150	.....	1,100	478	370
21	485	670	928	3,640	5,010	8,930	.....	9,200	.....	1,010	455	370
22	485	638	1,280	3,640	6,020	9,470	12,000	8,670	.....	930	455	410
23	485	638	1,100	2,240	6,240	10,300	11,400	7,650	.....	930	455	455
24	485	928	1,340	1,340	13,200	11,400	11,400	6,920	.....	855	455	478
25	485	1,880	1,540	1,190	67,100	11,100	12,000	6,920	.....	855	455	500
26	485	4,640	1,540	1,100	28,600	10,800	13,800	6,460	.....	855	455	500
27	485	3,640	1,340	1,540	24,200	10,800	15,100	.....	.....	855	478	455
28	485	2,120	1,340	2,500	20,100	10,800	13,500	.....	.....	855	500	455
29	485	1,760	1,760	4,290	.....	10,300	12,600	.....	.....	785	455	410
30	485	1,540	1,540	3,640	.....	10,300	12,600	.....	.....	785	455	410
31	515	.....	1,340	2,240	.....	13,200	.....	.....	.....	785	432	.....

NOTE.—No gage-height record Oct. 1–6, Apr. 8–21, May 13–19, and May 27–July 1.

Monthly discharge of Trinity River at Hoopa, Calif., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October 7–31	545	485	519	24,700
November	4,640	545	1,110	66,000
December	4,120	928	1,860	114,000
January	4,290	545	1,660	102,000
February	67,100	1,340	8,600	478,000
March	16,400	5,400	8,590	528,000
July 2–31	2,500	785	1,420	84,500
August	720	432	535	32,900
September	500	370	418	24,900

SMITH RIVER BASIN.

MIDDLE FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In the NE. ¼ SE. ¼ sec. 20, T. 17 N., R. 2 E., at highway bridge 800 feet above junction of North and Middle forks, one-eighth of a mile east of Gasquet, and 14 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—146 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1917 (not complete).

GAGE.—Inclined staff in two sections on right bank 40 feet upstream from new highway bridge. A chain gage attached to downstream hand rail of old highway bridge, 60 feet below staff gage, was read previous to May 26, 1915, and at various times since then when water was below staff gage. Gage read by A. W. Lewis.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Rough; boulders and gravel; somewhat shifting. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.1 feet at 8 a. m. April 11 (discharge, from extension of rating curve, 5,510 second-feet); minimum stage recorded, 3.52 feet (chain gage) October 3, 21, and 23 (discharge, 48 second-feet).

1911–1917: Maximum stage recorded, 17.5 feet at 1.30 p. m. November 25, 1915 (discharge, from extension of rating curve, 14,300 second-feet); minimum stage recorded, 3.45 feet (chain gage) at 10 a. m. October 21, 1915 (discharge, 38 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve for chain gage (read below stage, 4.0 feet) fairly well defined; for staff gage, well defined below 8,000 second-feet and is an extension above. Gage read to quarter-tenths once daily and sometimes twice. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	4.13	68	June 11	5.17	285
5	4.13	68	Aug. 24	4.06	59
June 11	5.19	297			

Daily discharge, in second-feet, of Middle Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	336	336	670	770	1,310	.....	450	.....	.....	.....
2	63	.....	470	1,450	602	720	3,180	.....	450	.....	.....	.....
3	.....	.....	.....	2,130	875	670	2,130	670	372	.....	.....	.....
4	48	336	1,770	1,170	930	.....	1,950	670	372	141	.....	.....
5	68	174	.....	4,990	930	1,450	2,130	.....	.....	.....	.....	.....
6	53	512	.....	2,040	875	1,100	1,950	.....	.....	.....	.....	.....
7	.....	354	.....	1,860	820	985	2,330	.....	.....	.....	.....	.....
8	.....	162	720	1,170	720	930	2,530	.....	.....	.....	.....	.....
9	.....	121	875	720	.....	1,040	1,950	.....	450	.....	.....	.....
10	.....	.....	720	720	670	930	1,610	.....	.....	.....	.....	.....
11	.....	.....	720	720	720	.....	4,990	.....	302	.....	.....	.....
12	.....	.....	535	670	720	770	3,070	720	270	.....	.....	.....
13	.....	.....	450	580	.....	770	2,330	.....	.....	.....	.....	.....
14	.....	88	372	.....	.....	720	2,040	558	.....	.....	.....	112
15	.....	.....	302	490	.....	720	.....	512	.....	.....	.....	.....
16	.....	.....	270	450	558	670	1,450	470	.....	.....	.....	.....
17	.....	.....	302	410	558	670	1,170	770	.....	.....	.....	.....
18	.....	.....	240	391	.....	.....	1,040	602	.....	.....	.....	50
19	.....	.....	240	.....	490	720	930	535	.....	.....	.....	50
20	50	.....	410	.....	535	720	1,170	.....	.....	.....	.....	50
21	48	.....	490	.....	558	930	1,690	490	.....	.....	.....	52
22	.....	.....	625	302	.....	820	1,770	490	.....	.....	.....	73
23	48	.....	625	302	720	770	1,950	490	212	.....	.....	60
24	50	.....	770	270	3,070	1,770	1,860	.....	199	.....	56	55
25	.....	.....	410	.....	2,330	.....	.....	.....	.....	.....	.....	52
26	.....	1,610	450	.....	1,530	1,610	1,530	.....	.....	.....	.....	.....
27	.....	985	410	.....	1,040	2,130	1,170	.....	.....	.....	.....	.....
28	.....	1,040	490	2,740	875	2,960	1,100	535	.....	.....	.....	.....
29	.....	625	410	1,380	.....	3,300	.....	.....	.....	.....	.....	.....
30	.....	.....	372	1,040	.....	2,230	820	.....	.....	.....	.....	.....
31	.....	.....	371	820	.....	1,530	.....	.....	.....	.....	.....	.....

NOTE.—Gage not read on days for which discharge is not given.

NORTH FORK OF SMITH RIVER NEAR CRESCENT CITY, CALIF.

LOCATION.—In SW. ¼ NE. ¼ sec. 20, T. 17 N., R. 2 E., half a mile northeast of Gasquet, half a mile above junction of North and Middle forks, and 15 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—About 81 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1917 (incomplete).

GAGE.—Staff in four sections on left bank installed December 5, 1911; read by A. W. Lewis. The original gage was washed out November 15, 1911. Its datum was not referred to that of present gage.

DISCHARGE MEASUREMENTS.—Made from cable at gage, or by wading.

CHANNEL AND CONTROL.—Rough; boulders and gravel. Control has not shifted since the present gage was installed. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.8 feet at 5 p. m. February 24 (discharge, 8,860 second-feet); minimum stage recorded, 8.49 feet October 20 and 23 (discharge, 66 second-feet).

1911–1917: Maximum stage recorded, 27.5 feet at 2.30 p. m. November 25, 1915 (discharge, from extension of rating curve, about 28,200 second-feet); minimum discharge recorded, 62 second-feet October 30, 1915.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 13,000 second-feet and extended above. Gage read to quarter-tenths feet once daily. Daily discharge ascertained by applying gage height to rating table. Records probably excellent when gage is read.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Smith River near Crescent City, Calif., during the year ending Sept. 30, 1917.

[Made by J. F. Kunesh.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	8.69	80	June 11	a 9.57	248
5	8.69	75	Aug. 24	8.50	66
June 11	a9.57	251			

a Gage height doubtful.

Daily discharge, in second-feet, of North Fork of Smith River near Crescent City, Calif., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.
1			665		1,030	930					
2			1,200		790	790	6,200				
3					1,480		3,760				
4	79	424	3,210				3,210				
5	76				1,330	2,990	3,320				
6		2,000			1,260	1,730					
7		1,030			1,030	1,330	2,380				
8		590			980	1,260					
9		456				1,400					
10					745	1,200	2,380				
11							8,860		250		
12				790		835	4,360		176		
13				745		835	3,210				
14		166				790	3,210	456			68
15				590		790		456			
16				555		705	1,730	456			
17				520	625		1,330	1,030			
18				488							
19					590			790			
20	66					880	1,030				
21					590		3,760				
22				394		1,080					80
23	66				790	1,030	3,760	456			
24				349	5,630	4,000	2,680			66	
25											
26		2,580			1,820	2,190					
27		1,330			1,330	3,760					
28		2,480			1,030	4,360	1,330				
29		1,260		2,100		5,630					
30				1,820		3,760					
31				1,140		2,190					

NOTE.—Gage not read on days for which discharge is not given.

MISCELLANEOUS MEASUREMENTS.

Measurements of the flow of streams in the Pacific slope drainage basins of California, at points other than those at which gaging stations are maintained, are recorded in the following table:

Miscellaneous discharge measurements in the Pacific slope basins of California during the year ending Sept. 30, 1917.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Nov. 7	San Diego River	Pacific Ocean	San Diego, Calif.		0
Dec. 30	do	do	do	8.19	14
Feb. 16	Cuyamaca Water Co.'s flume.	Diverts from San Diego River.	South Fork of San Diego River, Calif.		3.2
Dec. 12	do	do	Chocolate Creek, Calif.	.62	4.6
Feb. 15	do	do	Grossmont, Calif.	.35	1.7
16	South Fork San Diego River.	San Diego River	Abandoned gaging station, near mouth.	.47	5.8
Dec. 12	Cuyamaca Water Co.'s South Fork flume.	Diverts from South Fork of San Diego River.	Near intake, Calif.	.64	4.4
Jan 22	San Vicente Creek	San Diego River	Abandoned gaging station, near Foster, Calif.		25
Feb. 14	do	do	do		2.4
19	do	do	do		26
Mar. 12	do	do	do		15
28	do	do	do		4.2
Apr. 18	do	do	do		15
19	do	do	do		10
May 22	do	do	do		1.4
Oct. 7	San Luis Rey River	Pacific Ocean	Just below Warner dam site, Calif.	1.12	18
Nov. 18	do	do	do	1.29	11
25	do	do	do	1.31	14
22	do	do	Above intake at Escondido Mutual Water Co.'s canal, Calif.	1.67	13
Oct. 10	do	do	Mouth of canyon above Rincon, Calif.		18
Nov. 23	do	do	do		17
23	do	do	Opposite lower pumping plant at Rincon Indian Reservation, Calif.	9.04	16
Oct. 11	do	do	Just above mouth of Pauma Creek, Calif.		28
Nov. 23	do	do	do		24
Oct. 11	do	do	Below mouth of Agua Tibia Creek, Calif.		43
Nov. 23	do	do	do		35
Oct. 11	do	do	1,000 feet above United States Indian Service pumping plant at Pala, Calif.		41
Nov. 24	do	do	do		34
Oct. 7	La Jolla Creek	San Luis Rey River.	Mouth of canyon above diversion, Calif.	1.00	1.9
Nov. 22	do	do	do	1.03	1.3
Oct. 8	East Fork of Potrero Creek.	do	Above both diversions, Calif.	.15	1.0
Nov. 22	do	do	do	.13	.8
Oct. 8	West Potrero ditch	Diverts from East Fork of Potrero Creek.	Above dam, Calif.		.04
Nov. 22	do	do	do		.08
Oct. 8	West Fork of Potrero Creek.	San Luis Rey River.	Highway Crossing, Calif.	1.03	.1
Nov. 22	do	do	do	1.02	.1
22	Cuca Creek	do	Mouth, Calif.		.1
Oct. 10	Paradise Creek	do	Road crossing above E. M. W. Co.'s power house, Calif.	1.17	1.5
Nov. 23	do	do	do	1.06	1.0
Oct. 10	East Fork of Sparkman Creek.	do	Pala-Rincon road crossing, Calif.		2.5
Nov. 23	do	do	do		1.1
Oct. 10	Middle Fork of Sparkman Creek.	do	do		.06
Nov. 23	do	do	do		.05
Oct. 10	West Fork of Sparkman Creek.	do	do		1.3
Nov. 23	do	do	do		.08

Miscellaneous discharge measurements in the Pacific slope basins of California during the year ending Sept. 30, 1917—Continued.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 10	Ditch	Diverts from Salmon Spring.	Pala-Rincon road crossing, Calif.		.02
Nov. 23	do	do	do		0
23	Nigger Canyon Creek.	San Luis Rey River.	do		.2
Oct. 11	Pauma Creek	do	do		3.2
Nov. 23	do	do	Below intake of ditch, Calif.		3.5
23	Pauma Ranch ditch.	Diverts from Pauma Creek.	Intake, Calif.		.8
Oct. 11	Frey Creek	San Luis Rey River.	Pala-Rincon road crossing, Calif.		1.3
Nov. 23	do	do	do		.5
Oct. 11	Agua Tibia Creek	do	do		a 2
Nov. 24	do	do	Above intake of ditch at mouth of canyon, Calif.	.67	2.3
Oct. 11	Marion Creek	do	Pala-Rincon road crossing, Calif.		1.1
Nov. 24	do	do	Above diversions at mouth of canyon, Calif.		.4
24	West Fork of Marion Creek.	Marion Creek	Mouth, Calif.		.05
Feb. 13	Temecula Creek	Santa Margarita	Above junction with Murrieta Creek, Calif.		14
Mar. 7	do	do	do		26
27	do	do	do		15
Feb. 13	Murrieta Creek	Temecula Creek	Mouth, Calif.		2.1
Mar. 7	do	do	do		3.5
27	do	do	do		1.7
27	Temescal Water Co.'s canal.	Diverts from San Jacinto River.	Just above U. S. Geol. Survey gaging station on San Jacinto River near Elsinore, Calif.		6.4
Apr. 21	do	do	do		9.8
May 20	do	do	do		5.5
Jan. 12	Brea Canyon Creek	Santa Ana River	Just below junction with Canada del Rodeo, Calif.		1.0
27	do	do	do		1.3
Feb. 25	do	do	do		23
Apr. 7	do	do	do		a 3
Jan. 12	Canada del Rodeo	Brea Canyon Creek	Just above Birch Oil Co.'s dam in NW. ¼ NW. ¼, sec. 32, T. 2 S., R. 9 W., Calif.		.2
Apr. 7	do	do	do		.03
Jan. 12	do	do	Just below Birch Oil Co.'s dam in NW. ¼, NW. ¼, sec. 32, T. 2 S., R. 9. W., Calif.		.1
Feb. 25	do	do	do		4.6
Mar. 23	do	do	do		.1
Jan. 12	do	do	Just above mouth, Calif.		.3
26	do	do	do		.2
Feb. 25	do	do	do		7.5
Apr. 7	do	do	do		a .05
Mar. 23	Birch Oil Co.'s diversion.	Diverts from Canada del Rodeo.	At storage tanks at Brea oil fields, 3 miles below intake, Calif.		.05
Feb. 19	Evey Creek	San Antonion Creek	Mouth of canyon, Calif.		.8
Apr. 5	do	do	do		.7
26	do	do	do		.7
Feb. 20	Thompson Creek	San Jose Wash	Above junction with North Fork, Calif.		.4
Mar. 17	do	do	Mouth of canyon below forks, Calif.		.5
Apr. 26	do	do	do		.0
Feb. 20	Liveoak Creek	do	Mouth of canyon, Calif.		.3
Mar. 17	do	do	Below camp Eno, Calif.		.5
Apr. 26	do	do	do		.3
Feb. 20	Big Dalton Creek	San Dimas Wash	Below old dam near mouth of Canyon, Calif.		2.3
28	do	do	100 feet above old dam, Calif.		8.6
Mar. 17	do	do	75 feet above old dam, Calif.		2.9
Apr. 26	do	do	600 feet below intake of pipe line, Calif.		.01
26	Pipe line	Diverts from Dalton Creek.	Below tunnel, Calif.		1.3
Feb. 20	Little Dalton Creek	Big Dalton Creek	Private bridge near Glendora, Calif.		1.0
28	do	do	100 feet above concrete check dam, Calif.		4.2
Mar. 17	do	do	do		1.6
Apr. 26	do	do	do		.7

a Estimated.

Miscellaneous discharge measurements in the Pacific slope basins of California during the year ending Sept. 30, 1917—Continued.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 26	Eaton Creek	Rio Hondo	Above intake of Precipice Water Co., Calif.		1.5
Nov. 23	do	do	Above upper dam, Calif.		1.5
Jan. 8	do	do	do		4.6
June 6	do	do	do		1.4
Aug. 27	do	do	do		1.0
Nov. 23	do	do	Above lower dam, Calif.		.9
Jan. 8	do	do	do		3.7
June 6	do	do	500 feet below upper tunnel, Calif.		2.3
Jan. 8	do	do	Mount Wilson toll bridge, Calif.		5.7
Feb. 21	do	do	do		41
23	do	do	do		36
Mar. 15	do	do	do		6.1
28	do	do	do		2.5
Apr. 25	do	do	do		.4
June 6	do	do	do		.05
Aug. 27	do	do	do		.0
Mar. 15	Millard Canyon	Arroyo Seco	Mouth, Calif.		1.9
Apr. 25	do	do	do		.3
May 29	do	do	do		.7
Aug. 27	do	do	do		.0
Mar. 1	Cook Creek	Los Angeles River	Just below junction of main forks near la Crescenta, Calif.		.2
Aug. 2	Ditch	Diverts from Tujunga Creek.	Bryants Cold Spring, Calif.		1.1
Feb. 13	Little Tujunga Creek.	Tujunga Creek	Near mouth of canyon, Calif.	6.86	2.0
Mar. 5	do	do	do	7.00	8.1
Apr. 11	do	do	do	6.80	1.6
24	do	do	do	6.81	1.8
May 3	do	do	do	6.77	1.4
Feb. 13	Maclay ditch	Diverts from Pacoima Creek.	Intake, Calif.		3.5
16	do	do	do		2.4
Feb. 5	West Fork of Sespe Creek.	Sespe Creek	Mouth, Calif.	2.10	8.9
6	Coldwater Creek	do	do	1.75	.6
6	Pine Creek	do	do	1.36	1.7
6	Fillmore Irrigation Co.'s canal.	Diverts from Sespe Creek.	One-fourth mile below intake, Calif.	1.20	1.5
6	Little Sespe Creek	Sespe Creek	One-fourth mile above mouth, Calif.		1.3
June 28	Gobernador Creek	Pacific Ocean	200 feet above Gobernador Water Co.'s diversion, Calif.		a1.4
Feb. 8	Gobernador Water Co.'s pipe line.	Diverts from Gobernado Creek.	First gate box below diversion dam, Calif.		.4
Jan. 13	Devil Canyon Creek.	Santa Ynez River	Mouth, Calif.		2.0
Feb. 7	do	do	do		b.65
9	do	do	do		b.6
10	do	do	do		b.5
28	do	do	do		9.7
Mar. 14	do	do	do		3.8
June 26	Carmel River	Pacific Ocean	NE. ¼ sec. 30, T. 16 S., R. 2 E., Calif.		24

Tulare Lake basin.

May 29	Deer Creek	Tulare Lake	Highway bridge on Porterville-Hot Springs road, near Porterville, Calif.		52
June 13	do	do	do		33
July 20	do	do	do		4.6
May 29	North Fork of Tule River.	Tule River	Battle Mountain, near Milo, Calif.		49
June 13	do	do	do		54
July 20	do	do	do		5.3
June 1	Grouse Creek	South Fork of Kaweah River.	One-half mile above mouth, Calif.		2.0

a Gobernador Water Co. diverting entire flow, but considerable water is wasted back into creek.
b Weir measurement.

Miscellaneous discharge measurements in the Pacific slope basins of California during the year ending Sept. 30, 1917—Continued.

San Joaquin River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 21	Merced River	San Joaquin River	Above Illilouette Creek, near Yosemite, Calif.	1.50	29
Oct. 8	....do	....do	Yosemite, Calif.	3.11	217
Jan. 22	....do	....do	....do	2.55	61
Apr. 17	....do	....do	....do	3.70	477
June 6	....do	....do	....do	6.88	2,450
30	....do	....do	....do	5.52	1,540
July 2	....do	....do	....do	5.36	1,410
Jan. 21	Illilouette Creek	Merced River	Near Yosemite, Calif.	1.70	14
Nov. 30	Rancheria Creek	Tuolumne River	Mouth, Calif.		30
Jan. 29	....do	....do	....do		48
Oct. 17	Eleanor Creek	Cherry Creek	One-fourth mile above Lake Eleanor, Calif.		97
Nov. 15	....do	....do	....do		38
Dec. 20	....do	....do	....do		49
Feb. 16	....do	....do	....do		55
Mar. 20	....do	....do	....do		82
Aug. 10	....do	....do	....do		9.1
Oct. 17	Frog Creek	Eleanor Creek	....do		35
Nov. 15	....do	....do	....do		16
Dec. 20	....do	....do	....do		17
Feb. 16	....do	....do	....do		19
Mar. 30	....do	....do	....do		63
Aug. 14	....do	....do	....do		1.2
Oct. 20	Kibbie Creek	....do	One mile above Lake Eleanor, Calif.		8.1
Nov. 23	....do	....do	....do		6.6
Aug. 20	....do	....do	One-fourth mile above Lake Eleanor, Calif.		.1
Oct. 20	Clavey Creek	Tuolumne River	Gaging station near Tuolumne, Calif.	10.32	42
July 6	....do	....do	....do		252
Aug. 24	....do	....do	....do	10.1	31
Oct. 21	North Fork of Tuolumne River.	....do	....do	2.14	17
Aug. 24	....do	....do	....do	1.93	11
July 3	Golden Rock Ditch	Diverts from South Fork of Tuolumne River.	800 feet below diversion dam 4 miles west of Sequoia, Calif.	1.95	32
Sept. 15	Stanislaus River	San Joaquin River	Stanislaus, Calif.	1.73	250
17	....do	....do	....do		324
21	....do	....do	....do	2.22	327
24	....do	....do	....do	2.90	466
24	....do	....do	....do		349
25	....do	....do	....do	2.21	326
30	....do	....do	....do	1.55	184
Sept. 15-30	Rose Creek	Stanislaus River	Mouth, Calif.		0
Aug. 20	South Fork of Stanislaus River.	....do	One-half mile above lower Strawberry Reservoir, Calif.		14
31	....do	....do	....do		11

Sacramento River basin.

Sept. 28	Sacramento River	Suisun Bay	One-fourth mile above mouth of American River, Calif.		7,280
29	....do	....do	....do		7,530
29	....do	....do	....do		7,480
Nov. 12	Cold Creek	Sacramento River	Near northwest corner sec. 21, T. 40 N., R. 4 W., Calif.		11
June 16	Pit River	....do	One-eighth mile below McConnel-McBrien dam in sec. 28, T. 42 N., R. 11 E., Calif.		101
May 24	North Fork of Pit River.	Pit River	SW. ¼ sec. 5, T. 42 N., R. 13 E., Calif.		233
June 15	....do	....do	....do		85
15	....do	....do	Below all diversions in SW. ¼ sec. 7, T. 42 N., R. 13 E., Calif.		37
Dec. 5	Montgomery Creek	Pit River	At former gaging station, Montgomery Creek, Calif.	1.55	91
Sept. 14	Poplar Creek	Middle Fork of Feather River.	One mile above mouth, Calif.		7.9
Nov. 6	South Fork of North Fork of Yuba River.	North Fork of Yuba River.	500 feet above mouth, Calif.		135
4	Ditch	Diverts from Rock Creek.	Near ranger station at Goodyear Bar, Calif.		.4
Sept. 29	American River	Sacramento River	Mouth, Calif.		246

Miscellaneous discharge measurements in the Pacific slope basins of California during the year ending Sept. 30, 1917—Continued.

Streams north of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 17	Eel River	Pacific Ocean	Dos Rios, Calif.		561
Aug. 18	do	do	do		17
June 14	South Eel River	Eel River	Mouth, Calif.		47
Aug. 18	do	do	do		2.2
28	Redwood Creek	Pacific Ocean	Gaging station near Korbel, Calif.	4.9	5.0
June 13	do	do	Gaging station at Orick, Calif.	5.29	200
Oct. 13	Big Spring Creek	Klamath Marsh	Below tributary on Lenz ranch, in sec. 22, T. 30 S., R. 8 E., Oreg.		50
June 15	do	do	do		52
Oct. 13	Sand Creek	do	Crescent Road crossing, Oreg.		6.7
June 15	do	do	do		20.0
26	Spring Creek	Williamson River	Above rapids, near mouth; Oreg.		315
Sept. 13	Sprague River	do	Ford above Sycan River, near Beatty, Oreg.		165
Apr. 17	Five Mile Creek	Sprague River	1 mile above mouth, in sec. 2, T. 36 S., R. 13 E., near Bly, Oreg.	1.53	37.2
18	do	do	do	1.38	33.2
June 30	do	do	do	[a] 1.90	22.4
Sept. 8	do	do	do	[a] 1.80	20.9
11	do	do	do	[a] 1.90	23.2
13	Brown Creek	do	Near headgates of canals, Oreg.		5.7
Oct. 10	Fort Creek	Wood River	Near Fort Klamath, Oreg., in sec. 26, T. 33 S., R. 7½ E.	1.76	82
Apr. 30	do	do	do	1.64	90
Sept. 3	do	do	do	1.72	92
Oct. 10	Crooked Creek	do	Klamath Agency, Oreg., in sec. 13, T. 34 S., R. 7½ E.	1.19	76
Apr. 30	do	do	do	1.58	97
Sept. 1	do	do	do	1.36	84
Oct. 7	Spencer Creek	Klamath River	1 mile below Buck Lake, Oreg.		23.2
22	do	do	Dam site at Buck Lake, Oreg.	.48	16.7
June 30	do	do	Half a mile below Buck Lake, Oreg.	.66	30.7
July 30	Shasta River	Klamath River	Above Lucerne Water Co. intake in sec. 6, T. 43 N., R. 5 W., Calif.		80
30	do	do	T. 45 N., R. 6 W., Calif.		28
31	do	do	do		33
Oct. 27	Scott River	do	Callahan, Calif.		19
July 23	do	do	do		30
Nov. 8	do	do	Old Ohio House bridge, 12 miles south of Fort Jones, Calif.		43
July 23	do	do	do		49
23	do	do	1 mile west of Fort Jones, Calif.		89
Oct. 30	do	do	Mouth; Calif.		103
30	do	do	do		102
May 22	do	do	do		1,310
July 23	Sugar Creek	Scott River	do		2.4
23	French Creek	do	do		6.8
Oct. 9	Supply Creek	Trinity River	Hoopa, Calif.		4.3
9	do	do	do		5.1
June 16	do	do	do		18
Aug. 22	do	do	do		4.4

[a] Stage discharge relation affected by back water from diversion dam.

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STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the annual reports, bulletins, professional papers, and monographs.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 704 Journal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Helena, Mont., Montana National Bank Building.
Topeka, Kans., 23 Federal Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tucson, Ariz., University of Arizona.
Austin, Tex., Capitol Building.
Honolulu, Hawaii, 14 Capitol Building.
Portland, Oreg., 606 Post Office Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 619 Federal Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 4,240 points in the United States, and the data obtained have been published in the reports tabulated below.

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discgarhe (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage height and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only.	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data coverng earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions measurements, and gage heights western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1917. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1917, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, and 451, which contain records for the New England streams from 1903 to 1917. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1917.

Year.	I North Atlantic slope basins (St. John River to York River).	II South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	III Ohio River basin.	IV St. Lawrence River basin.	V Hudson Bay and upper Mississippi River basins.	VI Missouri River basin.	VII Lower Mississippi River basin.	VIII Western Gulf of Mexico basins.	IX Colorado River basin.	X Great Basin.	XI Pacific slope basins in California.	XII North Pacific slope basins.		
												Pacific slope basins in Washington and upper Columbia River basin.	Snake River basin.	Lower Columbia River basin and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohawk River only.
[f] Kings and Kern rivers and south Pacific slope drainage basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England Rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are taken up in order around the rim of the lake.

PRINCIPAL STREAMS.

The rivers draining into the Pacific Ocean from California include San Diego, San Dieguito, San Luis Rey, Santa Ana, San Gabriel, Los Angeles, Santa Ynez, Santa Maria, and Salinas rivers, draining areas south of San Francisco Bay; San Joaquin River, whose chief tributaries are Kings, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers; Sacramento River, whose principal tributaries are Pit, Feather, and American rivers; and Russian, Eel, Mad, Klamath, and Smith rivers, which flow into the ocean north of San Francisco Bay. Except Klamath River, which receives the drainage from a small area in Oregon, and a few streams in Oregon that flow into Goose Lake, at the head of Pit River, all the streams in this division are entirely in California.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. xxiv.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1917; period after date indicates discontinuance.

DRAINAGE BASINS SOUTH OF SAN FRANCISCO BAY

Tia Juana River near Nestor, Calif., 1915.
Cottonwood Creek near Morena reservoir, Calif., 1916.
Cottonwood Creek near Dulzura, Calif., 1906–1915.
Dulzura conduit near Dulzura, Calif., 1909–1915.
Pine Valley Creek near Jamul, Calif., 1906–1908.
Sweet water River near Descanso, Calif., 1905–
Sweetwater River near Dehesa, Calif., 1913–1916.
Sweetwater River at Sweetwater dam, Calif., 1916.
San Diego River at diverting dam, near Lakeside, Calif., 1912–1916.
San Diego River at Lakeside, Calif., 1905–1916.

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San Diego River near Santee, Calif., 1912–
San Diego River at San Diego, Calif., 1912–1916.
Boulder Creek at Cuyamaca reservoir, near Julian, Calif., 1912–
Boulder Creek at mouth, near Lakeside, Calif., 1912–1916.
Cuyamaca Water Co.'s flume at diverting dam, near Lakeside, Calif., 1912–
Cuyamaca Water Co.'s flume near Lakeside, Calif., 1907–
South Fork of San Diego River near Alpine, Calif., 1913–1915.
South Fork flume near Alpine, Calif., 1913–1915.
San Vincente Creek at Foster, Calif., 1915.
Santa Ysabel Creek (head of San Dieguito River) near Santa Ysabel, Calif., 1913–1915.
Santa Ysabel Creek near Mesa Grande, Calif., 1912–
Santa Ysabel Creek near Ramona, Calif., 1912–
Santa Ysabel Creek near Escondido, Calif., 1905–1912.
San Dieguito River at Bernardo, Calif., 1912–1916.
San Dieguito River near Bernardo, Calif., 1916–
San Dieguito River near Del Mar, Calif., 1913–14.
Black Canyon Creek near Mesa Grande, Calif., 1913–1916; 1917–
Temescal Creek near Almond, Calif., 1913–1915.
Guejito Creek near Escondido, Calif., 1915; 1916–
East San Pasqual ditch near Escondido, Calif., 1912–1914.
West San Pasqual ditch near Escondido, Calif., 1912–1915.
Santa Maria Creek near Ramona, Calif., 1912–
San Luis Rey River near Warner Springs, Calif., 1913–1916.
San Luis Rey River near Mesa Grande, Calif., 1911–
San Luis Rey River near Nellie, Calif, 1915–16; 1917.
San Luis Rey River at diversion flume, 1894–1899.
San Luis Rey River near Pala, Calif., 1903–1916.
San Luis Rey River at Pala, Calif., 1912.
San Luis Rey River at Bonsall, Calif., 1912–1916.
San Luis Rey River near Bonsall, Calif., 1916–
San Luis Rey River near Oceanside, Calif., 1912–1915.
San Luis Rey River at Oceanside, Calif., 1916.
Agua Caliente Creek near Warner Springs, Calif., 1913–1915.
Canada Verde Creek near Warner Springs, Calif., 1913–1915.
West Fork of San Luis Rey River near Warner Springs, Calif., 1913–1916.
Carrizo Creek near Warner Springs, Calif., 1913–1916.
Susanna Creek near Warner Springs, Calif., 1913–1916.
Matagual Creek near Warner Springs, Calif., 1912–1916.
Escondido Mutual Water Co.'s canal near Nellie, Calif., 1896–
Rincon Indian Reservation ditch near Valley Center, Calif., 1912.
Pala Indian Reservation canal at Pala, Calif., 1912–13.
San Luis Rey ditch near San Luis Rey, Calif., 1913.
Temecula Creek (head of Santa Margarita River) near Temecula, Calif., 1905–6.
Santa Ana River near Mentone, Calif., 1896–
Santa Ana River at San Bernardino, Calif., 1916.
Southern California Edison Co.'s[1] canal and Greenspot pipe line near Mentone, Calif., 1896–
Highlands or North Fork canal at intake weir, San Bernardino County, Calif., 1896–1904.
Redlands or South Fork canal at sand-box weir, San Bernardino County, Calif., 1896–1904.
Mill Creek in canyon, near headworks of Crafton canal, Calif., 1896–1905.
Mill Creek at Forest Home, Calif., 1903–

[1] Formerly published as "Pacific Light & Power Co.'s canal and Greenspot pipe line near Montone, Calif."

Santa Ana River tributaries—Continued.
Waterman Canyon Creek near San Bernardino, Calif., 1911–1914.
Devil Canyon Creek near San Bernardino, Calif., 1911–1914.
Lytle Creek at mouth of canyon, near San Bernardino, Calif., 1894–1901; 1904–
Lytle Creek at San Bernardino, Calif., 1916.
South Fork of San Jacinto River at Hemet reservoir, near San Jacinto, Calif. 1916.
San Jacinto River near Elsinore, Calif., 1916–
Elsinore Lake at Elsinore, Calif., 1915–
Temescal Creek near Elsinore, Calif., 1916–
Temescal Creek near Rincon, Calif., 1899.
Coldwater Creek above dam, Riverside County, Calif., 1899.
San Antonio Creek near Claremont, Calif., 1916; 1917–
San Antonio Creek near Upland, Calif., 1901–
Southern California Edison Co.'s canal near Claremont, Calif.,[1] 1917–
San Gabriel River above Fish Fork, near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water records.)
San Gabriel River at headworks near Azusa, Calif., 1912–1914.
San Gabriel River near Azusa, Calif., 1894–
Southern California Edison Co.'s canal near Azusa, Calif.,[2] 1896–
West Branch of North Fork of San Gabriel River at weir, 1900.
North Branch of North Fork of San Gabriel River at weir, 1900.
West Fork of San Gabriel River above North Fork, Calif., 1900.
Coldwater Creek at weir above mouth, 1900.
Fish Fork of San Gabriel River near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water record.)
Iron Fork of San Gabriel River near Azusa, Calif., 1900–1901; 1910; 1912. (Low-water record.)
Rogers Creek near Azusa, Calif., 1916–
Fish Creek near Duarte, Calif., 1916–
Sawpit Creek at Monrovia, Calif., 1916–
Monrovia pipe line near Monrovia, Calif., 1916–
San Dimas Creek near San Dimas, Calif., 1916–
Santa Anita Creek near Sierra Madre, Calif., 1916–
Little Santa Anita Creek near Sierra Madre, Calif., 1916–
Los Angeles River at Los Angeles, Calif., 1896–1900; 1916.
Los Angeles River between Dominguez Junction and Cerritos, Calif., 1916.
Pacoima Creek near San Fernando, Calif., 1916–
Tujunga Creek near Sunland, Calif., 1916–
Haines Creek near Tujunga, Calif., 1917–
Arroyo Seco near Pasadena, Calif., 1910–
Arroyo Seco at Los Angeles, Calif., 1916.
Malibu Creek near Calabasas, Calif., 1903–1906.
Triunfo Creek near Calabasas, Calif., 1903–1906.
Santa Clara River at Fillmore, Calif., 1911–12.
Piru Creek near Piru, Calif., 1911–1913.
Sespe Creek near Sespe, Calif., 1915–
Sespe Creek at Sespe, Calif., 1911–1913.
Santa Paula Creek near Santa Paula, Calif., 1911–1913.
Ventura River near Nordhoff, Calif., 1911–1914.
Ventura River near Ventura, Calif., 1911–1914.
Carpinteria Creek:
Gobernador Creek near Carpinteria, Calif., 1916–

[1] Formerly published as "Pacific Light & Power Co.'s canal near Claremont, Calif."
[2] Formerly published as "Pacific Light & Power Co.'s canal near Azuza, Calif."

San Roque Creek, Santa Barbara, County, Calif., 1890.
San Jose Creek, Santa Barbara County, Calif, 1890.
Loma Abajo River, Santa Barbara County, Calif., 1890.
Gato Creek at mouth, Santa Barbara County, Calif., 1890.
Santa Ynez River near Santa Barbara, Calif., 1903–1908; 1910–
Santa Ynez River near Lompoc, Calif., 1906–
Mono Creek at Mono dam site, near Santa Barbara, Calif., 1902–1904.
Mission tunnel near Santa Barbara, Calif., 1912–
Santa Maria River near Santa Maria, Calif., 1903–1906.
Salinas River near Salinas, Calif., 1900–1901.
Nacimiento Creek near Bryson, Calif., 1901.
San Antonio River near Jolon, Calif., 1900–1901.
San Lorenzo Creek near King City, Calif., 1900–1903; 1912.
Arroyo Seco near Soledad, Calif., 1901–
Pajaro River at Watsonville, Calif., 1911–1914.

SAN FRANCISCO BAY.

MINOR STREAMS.

Coyote River near Madrone, Calif., 1902–1912; 1916–
Coyote River at Coyote, Calif., 1916–
Coyote River near Edenvale, Calif., 1916–
Coyote River at San Jose, Calif., 1916–17.
Laguna Seca at Coyote, Calif., 1916–
Alameda Creek at Sunolglen, Calif., 1900–
Alameda Creek near Niles, Calif., 1916–
Alameda Creek near Decoto, Calif., 1916–
Spring Valley Water Co.'s aqueduct near Sunolglen, Calif., 1903–
Crandall Slough near Centerville, Calif., 1916–
Laguna Creek near Irvington, Calif., 1916–
Dry Creek near Decoto, Calif., 1916–

KERN RIVER BASIN.

Kern River near Kernville, Calif., 1912–
Kern River at Kernville, Calif., 1905–1912.
Kern River at Isabella, Calif., 1910–1912.
Kern River at Rio Bravo ranch, Calif., 1878–1884.
Kern River near Bakersfield, Calif., 1894–
Kern River Power Co.'s canal at Kernville, Calif., 1910–1914.
South Fork of Kern River near Onyx, Calif., 1911–1914.
South Fork of Kern River at Isabella, Calif., 1910–1913.
Erskine Creek near Bodfish, Calif., 1911–1916.
Caliente Creek at base of foothills, Kern County, Calif., 1878–1884.
Basin Creek near Havilah, Calif., 1911–1913.
Tejon House Creek at Tejon ranch house, Calif., 1895–96.
San Emigdio Creek at San Emigdio ranch house, Calif., 1894–95.

TULARE LAKE BASIN.

Tulare Lake in Kings County, Calif., 1906–
Poso Creek at base of foothills, Kern County, Calif., 1878–1884.
White River at base of foothills, Tulare County, Calif., 1878–1884.
White River near Hot Springs, Calif., 1911–1913.
Deer Creek at base of foothills, Tulare County, Calif., 1878–1884.
Deer Creek at Hot Springs, Calif., 1910–
Tyler Creek near Hot Springs, Calif., 1911–1913.
Tule River, North Fork of Middle Fork, near Springville, Calif., 1909–1913.

Tule River near Porterville, Calif., 1901–
Tule River at Porterville, Calif., 1878–1884.
South Fork of Middle Fork of Tule River near Springville, Calif., 1909–1913.
Bear Creek near Springville, Calif., 1911–1916.
South Fork of Tule River near Porterville, Calif., 1910–
Kaweah River, Middle Fork, near Hammond, Calif., 1913.
Kaweah River at Wachumna Hill, Calif., 1878–1884.
Kaweah River near Three Rivers, Calif., 1903–
Marble Fork of Kaweah River near Ranger, Calif., 1913.
East Fork of Kaweah River near Hammond, Calif., 1913.
North Fork of Kaweah River near Kaweah, Calif., 1913.
North Fork of Kaweah River at Kaweah, Calif., 1910–
South Fork of Kaweah River near Three Rivers, Calif., 1911–
Kings River at Suspension Bridge, Calif., 1895.
Kings River near Sanger, Calif., 1895–
Kings River at Slate Point, Calif., 1878–1884.
Kings River at Kingsburg, Calif., 1891–1904.
Dinkey Creek near Ockenden, Calif., 1910–1915.
Big Creek near Tollhouse, Calif., 1911–1914.
Rush Creek near Ockenden, Calif., 1910–1913.

SAN JOAQUIN RIVER BASIN.

San Joaquin River Basin near Shaver, Calif., 1912–1915.
San Joaquin River near North Fork, Calif., 1910–1914.
San Joaquin River near Friant, Calif., 1907–
San Joaquin River near Hamptonville, Calif., 1878–1884.
San Joaquin River at Herndon, Calif., 1891–1909.
San Joaquin River near Newman, Calif., 1912–
Big Creek near Big Creek, Calif., 1910–1915.
Pitman Creek at Big Creek, Calif., 1910–1915.
Stevenson Creek at Shaver, Calif., 1916–
Fresno Flume & Lumber Co.'s upper flume at Shaver, Calif., 1915–
Fresno Flume & Lumber Co.'s lower flume at Shaver, Calif., 1916–
North Fork Creek near North Fork, Calif., 1910–11.
Crane Valley reservoir near North Fork, Calif., 1910–1915.
Evaporation from Crane Valley reservoir near North Fork, Calif., 1910–1915.
South Fork Creek near North Fork, Calif., 1910–1915.
South Fork ditch near North Fork, Calif., 1910; 1913.
Whiskey Creek near North Fork, Calif., 1910–1915.
Cascadel Creek near North Fork, Calif., 1910–1912.
Fresno River at base of foothills, Madera County, Calif., 1878–1884.
Fresno River near Knowles, Calif., 1911–1914; 1915–
Nelder Creek near Fresno Flats, 1910–1912.
North Fork of Fresno River near Sugar Pine, Calif., 1910–1912.
Chowchilla Creek at base of foothills, near Buchanan, Calif., 1878–1884.
Mariposa Creek at base of foothills, Mariposa County, Calif., 1878–1884.
Bear Creek at base of foothills, Merced County, Calif., 1878–1884.
Merced River above Illilouette Creek, near Yosemite, Calif., 1915–16.
Merced River at Happy Isles Bridge, near Yosemite, Calif., 1915–
Merced River at Pohono Bridge near Yosemite, Calif., 1916–
Merced River at Yosemite, Calif., 1904–1909; 1912–1916.
Merced River at Exchequer, Calif., 1915–
Merced River near Merced Falls, Calif., 1901–1913.
Merced River at Merced Falls, Calif., 1878–1884.

San Joaquin River tributaries—Continued.
Merced River near Newman, Calif., 1912.
Illilouette Creek near Yosemite, Calif., 1915–16.
Tenaya Creek near Yosemite, Calif., 1904–1909; 1912–
Yosemite Creek at Yosemite, Calif., 1904–1909; 1912–
South Fork of Merced River near Wawona, Calif., 1910–
Big Creek near Wawona, Calif., 1910–11.
Tuolumne River at Hetch Hetchy cabin, near Sequoia, Calif., 1910–1916.
Tuolumne River at Hetch Hetchy dam site, near Sequoia, Calif., 1901; 1910–1915.
Tuolumne River below Hetch Hetchy dam site, near Sequoia, Calif., 1914–
Tuolumne River near Buck Meadows [Groveland], Calif., 1907–
Tuolumne River above La Grange dam, near La Grange, Calif., 1915–
Tuolumne River near La Grange, Calif., 1895–
Tuolumne River at Modesto, Calif., 1878–1884; 1891–1897.
Falls Creek near Sequoia, Calif., 1915–
Cherry Creek near Sequoia, Calif., 1901; 1910–
Eleanor Creek near Sequoia, Calif., 1909–
Evaporation from Lake Eleanor near Sequoia, Calif., 1915–
Jawbone Creek near Tuolumne, Calif., 1910–1915.
Corral Creek near Groveland, Calif., 1910–1913.
South Fork of Tuolumne River near Sequoia, Calif., 1914–
South Fork of Tuolumne River near Buck Meadows [Groveland], Calif., 1910–
Middle Fork of Tuolumne River near Buck Meadows, Calif., 1916–
Golden Rock ditch near Sequoia, Calif., 1914–15.
Clavey River near Tuolumne, Calif., 1910–1913.
Indian Creek near Tuolumne, Calif., 1910–11.
North Fork of Tuolumne River near Tuolumne, Calif., 1910–11.
Hunter Creek near Tuolumne, Calif., 1910–1913.
La Grange [Yosemite] Water & Power Co.'s canal near La Grange, Calif., 1908–
Modesto canal near La Grange, Calif., 1903–
Turlock canal near La Grange, Calif., 1899–
Stanislaus River, Middle Fork, at Sand Bar Flat, near Avery, Calif., 1905–
Stanislaus River near Knights Ferry, Calif., 1915–
Stanislaus River at Knights Ferry, Calif., 1903–1916.
Stanislaus River at Oakdale, Calif., 1878–1884; 1895–1900.
Relief reservoir near Baker Station, Calif., 1910–
Relief Creek near Baker Station, Calif., 1910–
North Fork of Stanislaus River near Avery, Calif., 1914–
Utica Gold Mining Co.'s canal near Avery, Calif., 1914–
Rose Creek near Jupiter, Calif., 1910–1913.
Knight Creek near Jupiter, Calif., 1910–1913.
South Fork of Stanislaus River at Strawberry, Calif., 1911–1917.
South Fork of Stanislaus River near Columbia, Calif., 1910–1913.
South San Joaquin canal near Knights Ferry, Calif., 1913–
Oakdale canal near Knights Ferry, Calif., 1913–
Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry, Calif., 1904–1913.
Calaveras River at Jenny Lind, Calif., 1907–
Calaveras River near Bellota, Calif., 1878–1884.
Mokelumne River, North Fork, near West Point, Calif., 1917–
Mokelumne River at Electra, Calif., 1901; 1903–4.
Mokelumne River at Lone Star Mill, Calif., 1878–1884.
Mokelumne River near Clements, Calif., 1904–

San Joaquin River tributaries—Continued.
Mokelumne River at Lodi, Calif., 1891–1895.
Middle Fork of Mokelumne River at West Point, Calif., 1911–
South Fork of Mokelumne River near Railroad Flat, Calif., 1911–
Licking Fork of Mokelumne River near Railroad Flat, Calif., 1911–1917.
Dry Creek near Ione, Calif., 1911–12.
Dry Creek at base of foothills, San Joaquin County, Calif., 1878–1884.
Cosumnes River, North Fork, near Pleasant Valley, Calif., 1906–7.
Cosumnes River, North Fork, near Eldorado, Calif., 1911–
Cosumnes River at Michigan Bar, Calif., 1907–
Cosumnes River below Michigan Bar, Calif., 1878–1884.
Sly Park Creek at Park, Calif., 1906.

GOOSE LAKE BASIN.

Drews Creek reservoir near Lakeview, Oreg., 1913–1917.
Drews Creek near Lakeview, Oreg., 1909–1917.
Dog Creek near Lakeview, Oreg., 1912–13.
North Drews canal near Lakeview, Oreg., 1914–1917.
Cottonwood Creek near Lakeview, Oreg., 1908–1917.
Thomas Creek near Lakeview, Oreg., 1912–1917.

SACRAMENTO RIVER BASIN.

Sacramento River at Castella, Calif., 1910–
Sacramento River at Antler, Calif., 1910–11.
Sacramento River at Jellys Ferry, Calif., 1895–1902.
Sacramento River near Red Bluff, Calif., 1902–
Sacramento River at Red Bluff, Calif., 1894–1896.
Sacramento River at Collinsville, Calif., 1878–1885.
Pit River near Canby, Calif., 1904–5.
Pit River near Bieber, Calif., 1904–1908; 1913–14.
Pit River at Henderson, Calif., 1910–
Pit River near Ydalpom, Calif., 1910–
South Fork of Pit River near Ivy, Calif., 1904–5.
West Valley Creek near Likely, Calif., 1904–5.
Ash Creek at Adin, Calif., 1904–5.
Fall River at Fall River Mills, Calif., 1912–13.
Hat Creek at Hawkin's ranch, near Hat Creek, Calif., 1911–1913.
Hat Creek at Hat Creek, Calif., 1910–1917.
Rising River near Cassel, Calif., 1911–1914.
Burney Creek near Burney, Calif., 1911–1913.
Kosk Creek near Henderson, Calif., 1910–1916.
Montgomery Creek at Montgomery Creek, Calif., 1911–1913.
Squaw Creek near Ydalpom, Calif., 1911–1913.
McCloud River near Gregory, Calif., 1902–1908.
McCloud River at Baird, Calif., 1910–
Clear Creek near Shasta, Calif., 1911–1913.
Cow Creek, at Millville, Calif., 1911–1914.
Clover Creek at Millville, Calif., 1911–1914.
Little Cow Creek at Palo Cedro, Calif., 1911–1914.
Bear Creek near Millville, Calif., 1911–1914.
North Fork of Cottonwood Creek at Ono, Calif., 1907–1914.
Mill Creek near Los Molinos, Calif., 1909–1913.
Deer Creek near Nina, Calif., 1911–1915.
Stony Creek near Stonyford, Calif., 1913–1914.

Sacramento River tributaries—Continued.
Stony Creek near Fruto, Calif., 1901–1912.
Little Stony Creek near Lodoga, Calif., 1907–
Feather River, North Fork, above Prattville, Calif., 1905–1907.
Feather River, North Fork, near Prattville, Calif., 1905–
Feather River, North Fork, at Big Bar, Calif., 1911–
Feather River, North Fork, at Big Bend, Calif., 1905–1910.
Feather River at Oroville, Calif., 1902–
Hamilton Branch near Prattville, Calif., 1905–1907.
Butt Creek at Butte Valley, Calif., 1905–
Indian Creek near Crescent Mills, Calif., 1906–1909; 1911–
Spanish Creek at Keddie, Calif., 1911–
Middle Fork of Feather River at Sloat [near Cromberg], Calif., 1910–
Middle Fork of Feather River near Oroville, Calif., 1911–
Grizzly Creek near Beckwith, Calif., 1905–6.
South Fork of Feather River at Enterprise, Calif., 1911–
Palermo Land & Water Co.'s canal at Enterprise, Calif., 1911–
Yuba River, Middle Fork, near North Juan, Calif., 1900; 1910–
Yuba River at Smartsville, Calif., 1903–
Yuba River at Parks Bar bridge, near Smartsville, Calif., 1900.
Oregon Creek near North San Juan, Calif., 1910–
North Fork of Yuba River near Sierra City, Calif., 1911–1913.
North Fork of Yuba River at Goodyear Bar, Calif., 1910–
North Fork of Yuba River near North San Juan, Calif., 1900.
North Fork of North Fork of Yuba River at Downieville, Calif., 1910–
Rock Creek at Goodyear Bar, Calif., 1910–
Goodyear Creek at Goodyear Bar, Calif., 1910–
Bear River near Colfax, Calif., 1911–
Bear River at Van Trent, Calif., 1904–
Bear River canal near Colfax, Calif., 1911–
American River, North Fork, near Colfax, Calif., 1911–
American River at Fairoaks, Calif., 1904–
Middle Fork of American River near East Auburn, Calif., 1911–
Rubicon River at Rubicon Springs, Calif., 1910–1914.
Rubicon River near Quintette, Calif., 1909–1914.
Little Rubicon River near Rubicon Springs, Calif., 1910–11.
Little South Fork of Rubicon River at sawmill near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River below Gerle Creek near Quintette, Calif., 1910–1914.
Little South Fork of Rubicon River at mouth, near Quintette, Calif., 1909–1911.
Gerle Creek near Rubicon Springs, Calif., 1910–1914.
Little South Fork ditch at sawmill near Quintette, Calif., 1910–1913.
Pilot Creek near Quintette, Calif., 1910–1914.
Pilot Creek ditch near Quintette, Calif., 1910–1914.
South Fork of American River at Kyburz, Calif., 1906–7.
South Fork of American River near Kyburz, Calif., 1906.
South Fork of American River below Kyburz, Calif., 1907.
South Fork of American River near Placerville, Calif., 1911–
Clear Lake at Lakeport, Calif., 1874–1900; 1913–
Cache Creek at Lower Lake, Calif., 1901–1915.
Cache Creek at Yolo, Calif., 1903–
Putah Creek near Guenoc, Calif., 1904–1906.
Putah Creek at Winters, Calif., 1905–

DRAINAGE BASINS NORTH OF SAN FRANCISCO BAY.

RUSSIAN RIVER BASIN.

Russian River near Ukiah, Calif., 1911–1913.
Russian River at Geyserville, Calif., 1910–1913.
East Fork of Russian River near Ukiah, Calif., 1911–1913.

MATTOLE RIVER BASIN.

Mattole River near Petrolia, Calif., 1911–1913.

EEL RIVER BASIN.

South Eel River at Hearst, Calif., 1910–1013.
Eel River at Two Rivers, Calif., 1911–1913.
Eel River at Scotia, Calif., 1910–1915; 1916–
Middle Eel River near Covelo, Calif., 1911–
South Fork of Eel River at Garberville, Calif., 1911–1913.
Van Duzen River at Bridgeville, Calif., 1911–1913.
Yager Creek at Carlotta, Calif., 1911–1914.

MAD RIVER BASIN.

Mad River near Arcata, Calif., 1910–1913.

REDWOOD CREEK BASIN.

Redwood Creek near Korbel, Calif., 1911–1913.
Redwood Creek at Orick, Calif., 1911–1913.

KLAMATH RIVER BASIN.

Williamson River (head of Klamath River) above Spring Creek, near Chiloquin, Oreg., 1908–1910; 1912–13.
Williamson River near Silver Lake, Oreg., 1917–
Williamson River at Chiloquin, Oreg., 1911–1917.
Williamson River below Sprague River near Chiloquin, Oreg., 1917–
Upper Klamath Lake near Klamath Falls, Oreg., 1904; 1906–
Link River at Klamath Falls, Oreg., 1904–
Klamath River below Klamath Falls, Oreg., 1907–1909.
Klamath River at Keno, Oreg., 1904–1913.
Klamath River at Spencer Bridge, near Keno, Oreg., 1913–
Klamath River near Seiad Valley, Calif., 1912–
Klamath River near Happy Camp, Calif., 1911–12.
Klamath River near Requa, Calif., 1910–
Miller Creek near Crescent, Oreg., 1911–1914.
Scott Creek near Fort Klamath, Oreg., 1917–
Sand Creek near Fort Klamath, Oreg., 1917–
Sprague River, North Fork, near Bly, Oreg., 1917–
Sprague River near (above) Yainax, Oreg., 1912–
Sprague River near (below) Yainax, Oreg., 1904.
Sprague River at Chiloquin, Oreg., 1911–
Fivemile Creek near Bly, Oreg., 1917–
Sycan River near Silverlake, Oreg., 1905–6.
Sycan River near Yainax, Oreg., 1911–
Whiskey Creek near Beatty, Oreg., 1917–
Modoc Point canal near Chiloquin, Oreg., 1915–
Wood River at Fort Klamath, Oreg., 1911–
Anna Creek at Crater Lake post office, Oreg., 1913.

Klamath River tributaries—Continued.
Fourmile Creek near Odessa, Oreg., 1912–1917.
A canal at Klamath Falls, Oreg., 1911–
Lost River near Clear Lake, Calif., 1904–1909.
Lost River above Olene, Oreg., 1915–
Lost River at Olene, Oreg., 1904; 1907–1912.
Lost River at Wilson Bridge near Olene, Oreg., 1912–
Lost River at Merrill, Oreg., 1916.
Lost River near Merrill, Oreg., 1904–1909.
Tule Lake near Merrill, Oreg., 1904–
Miller Creek near Lorella, Oreg., 1909–
Olene Wasteway at Olene, Oreg., 1915–
Lost River diversion canal near Klamath Falls, Oreg., 1912–
G canal[1] at Lost River dam near Olene, Oreg., 1912–
Lower Klamath Lake near Mount Dome [Brownell], Calif., 1907–1909; 1912–
Beaver Creek near Lilyglen, Oreg., 1916–
Keene Creek near Ashland, Oreg., 1916–
Shasta River near Montague, Calif., 1911–1913; 1916–
Scott River, East Fork, near Callahan, Calif., 1910–1913.
Scott River, East Fork, at Callahan, Calif., 1913–
Scott River at Callahan, Calif., 1911–
Scott River near Scott Bar, Calif., 1911–1913.
Indian Creek near Happy Camp, Calif., 1911–
Reeve Davis flume near Happy Home, Calif., 1911–1913.
Salmon River at Somesbar, Calif., 1911–1915.
Trinity River near Trinity Center, Calif., 1910–1913.
Trinity River at Lewiston, Calif., 1911–
Trinity River near China Flat, Calif., 1911–1913.
Trinity River at Hoopa, Calif., 1911–1914; 1916–
Coffee Creek at Coffee, Calif., 1910–1914.
East Fork of Trinity River near Trinity Center, Calif., 1910–1914.
Swift Creek near Trinity Center, Calif., 1910–1914.
North Fork of Trinity River at Helena, Calif., 1911–1914.
South Fork of Trinity River near China Flat, Calif., 1911–1913.

SMITH RIVER BASIN.

Smith River, Middle Fork, near Crescent City, Calif., 1911–
North Fork of Smith River near Crescent City, Calif., 1911–
South Fork of Smith River near Crescent City, Calif., 1911–1913.

[1] Formerly called Griffith lateral.

REPORTS ON WATER RESOURCES OF PACIFIC SLOPE BASINS OF CALIFORNIA.

PUBLICATION OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*17. Irrigation near Bakersfield, Calif., by C. E. Grunsky. 1898. 96 pp., 16 pls.

*18. Irrigation near Fresno, Calif., by C. E. Grunsky. 1898. 94 pp., 14 pls.

*19. Irrigation near Merced, Calif., by C. E. Grunsky. 1899. 59 pp., 11 pls.

Water-supply Papers 17, 18, and 19 discuss the development of irrigation in the San Joaquin Valley, outline physiographic features, and give history of the various irrigation districts. Chiefly of historic interest as indicated by dates of publication.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

Describes the location and construction of various types of canals for irrigation.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along Sacramento, Pit, Feather, Yuba, American, Cosumnes-Mokelumne, Calaveras, Tuolumne, and Klamath rivers, California.

*45. Water storage on Cache Creek, Calif., by A. E. Chandler. 1901. 48 pp., 10 pls. 15c.

Discusses topography, precipitation, stream measurements, ground waters, and irrigation works in Cache Creek basin; includes description of Clear Lake.

46. Physical characteristics of Kern River, Calif., by F. H. Olmsted, and Reconnaissance of Yuba River, Calif., by Marsden Manson. 1901. 57 pp., 8 pls. 10c.

Describes topography of Kern River basin, gives estimates of daily and monthly discharge, and discusses possible utilization of storage sites and development of power. The second paper in the report gives similar data for Yuba River.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

Contains information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc.

*58. Storage of water on Kings River, Calif., by J. B. Lippincott. 1902. 101 pp., 32 pls. 15c.

Discusses physical features, rainfall, stream flow, evaporation and seepage, and power development; includes chapter (by Lewis A. Hicks) on the generation and transmission of electric power and installation of pumping plants.

*59. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part I, by J. B. Lippincott. 1902. 95 pp., 11 pls.

*60. Development and application of water near San Bernardino, Colton, and Riverside, Calif., Part II, by J. B. Lippincott. 1902. 45 pp. (97–141), 15c.

Nos. 59 and 60 describe topography, soil, climate, crops, canals, wells, and pumping plants; discuss briefly the manufacture of Portland cement in southern California.

*81. California hydrography, by J. B. Lippincott. 1903. 488 pp., 1 pl. 25c.

A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference for engineers and irrigators.

86. Storage reservoirs on Stony Creek, Calif., by Burt Cole. 1903. 62 pp., 16 pls. 15c.

Discusses briefly water supply of Glenn County as related to population and industry, irrigation districts, the proposed Stony Creek forest reserve, and storage sites on Grindstone, Salt, Briscoe, and Stony creeks.

*89. Water resources of the Salinas Valley, Calif., by Homer Hamlin. 1904. 91 pp., 12 pls. 15c.

Describes briefly the geography, topography, general and economic geology, climate, water supply, and irrigation of the Salinas Valley.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. Superseded by 152.

Cites statutory restriction of water pollution in California.

*112. Underflow tests in the drainage basin of Los Angeles River, by Homer Hamlin. 1905. 55 pp., 7 pls. 5c.

Discusses conditions under which ground water occurs in arid regions, and fluctuations in water level; describes machinery and methods used in sinking test wells and the results obtained at each station.

116. Water problems of Santa Barbara, Calif., by J. B. Lippincott. 1905. 99 pp., 8 pls. 10c.

Reviews earlier work in Santa Barbara region and describes near-by and distant water supplies, including Ventura and Santa Ynez rivers; discusses the quality of the water of the Santa Ynez (giving analyses) and the available reservoir sites.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Cites legislative acts relating to ground waters in California.

*137. Development of underground waters in the eastern coastal-plain region of southern California, by W. C. Mendenhall. 1905. 140 pp., 7 pls. 35c.

*138. Development of underground waters in the central coastal-plain region of southern California, by W. C. Mendenhall. 1905. 162 pp., 5 pls. 25c.

*139. Development of underground waters in the western coastal-plain region of southern California, by W. C. Mendenhall. 1905. 105 pp., 8 pls. 25c.

Three reports discussing the topography, crops, irrigation systems, and wells, and the effects of development and drought on changes in ground-water level. The area covered by these reports includes the Anaheim, Santa Ana, Downey, Las Bolsas, Santa Monica, and Redondo quadrangles in Orange and Los Angeles counties.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Contains chapters on measurements of underflow of Rio Hondo, San Gabriel, and Mohave rivers.

*142. The hydrology of San Bernardino Valley, Calif., by W. C. Mendenhall. 1905. 124 pp., 12 pls. 25c.

Discusses rainfall, soils, artesian areas, temperature, and chemical character of the ground waters, gives tables of flow of Santa Ana River, Mill Creek, and other streams, and lists of wells in Redlands and San Bernardino quadrangles.

146. Proceedings of second conference of engineers of the Reclamation Service; with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

A report on "Underground waters of southern California," by W. C. Mendenhall. Gives an account of early irrigation by use of surface waters, the development of artesian wells for irrigation, and discusses the origin, distribution, and character of the artesian waters, the causes of fluctuations in the supply, and the need of moderation in use.

A report on the Klamath project, by J. B. Lippincott. Describes Klamath River and its principal tributaries and Lost River and Tule Lake. Describes also the irrigable lands in Butte Valley and around Tule and Lower Klamath lakes and in the Klamath Indian Reservation.

A brief report on "Pumping underground water in southern California," by F. C. Finkle: Discusses underground reservoirs, the source, extent, and methods of replenishment of the water supply, and describes the efficiency of pumps and the development of electric power for pumping.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c. Contains:

Sacramento River flood, California, from report of S. G. Bennett. Gives accounts of flood on Sacramento River; describes briefly the streams of the basin, precipitation, discharge, damages, and prevention of future losses.

*149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in California.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates of flood flow and frequency (p. 85) for Tuolumne River at La Grange, Kern River at Rio Bravo ranch, and Kings River at Sanger.

*213. The surface water supply of California, 1906, by W. B. Clapp, with a section on ground-water levels in southern California, by W. C. Mendenhall. 1907. 219 pp., 4 pls. 25c.

Contains the results of a series of measurement of the fluctuation of ground-water levels made during 1904, 1905, and 1906. The wells were "so selected that they would be evenly distributed over the various basins which together make up the lowland areas of southern California, and would thus give an adequate basis for conclusions as to conditions in each of these basins."

*219. Ground waters and irrigation enterprises in the foothill belt, southern California, by W. C. Mendenhall. 1908. 180 pp., 9 pls. 50c.

Describes the general geologic conditions, physical features, rainfall, storage facilities, character and condition of subterranean reservoirs, measures for conservation of waters, and the ground waters by districts; discusses fluctuation in ground-water levels and gives results of measurements; describes irrigation enterprises and systems and gives statistics of wells.

*220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring. 1908. 86 pp., 10 pls. 20c.

Describes the rocks, streams, lakes, and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters. The greater part of the area described is considered part of the Great Basin, but the streams of a small area in the southern part are tributary to Goose Lake, which within historic times has overflowed southward to Pit River, a tributary of the Sacramento.

*222. Preliminary report on the ground waters of San Joaquin Valley, Calif., by W. C. Mendenhall. 1908. 52 pp., 1 pl. 10c.

Key Describes the geography of the valley, the rocks, soils, surface waters, and the origin, circulation, quantity, accessibility, and development of the ground waters; gives notes on water supply by counties.

237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.

Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.

251. Surface-water supply of the United States, 1907–8, Part XI. California, by W. B. Clapp and W. F. Martin. 1910. 363 pp., 7 pls. 35c.

Contains a section (pp. 338–348) on "fluctuations in ground-water levels in the valley of southern California." The measurements here published form a continuation of those published in Water-Supply Paper 213. They were made at irregular intervals during 1907–8 on the same wells that were measured during the earlier period, except for a few wells that had become inacessible.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Sacramento, Pit, Feather, Yuba, and American rivers, Stony and Putah creeks, and Tuolumne River; also of Link River, Oreg., in Klamath River basin.

295. Gazetteer of surface waters of California, Part I, Sacramento River basin, by B. D. Wood. 1912. 99 pp. 10c.

296. Gazetteer of surface waters of California, Part II, San Joaquin River basin, by B. D. Wood. 1912. 102 pp. 10c.

297. Gazetteer of surface waters of California, Part III, Pacific Coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.

Nos. 295–297 embrace descriptions of streams and lakes named on best available maps of California.

298. Water resources of California, Part I, Stream measurements in Sacramento River basin, by H. D. McGlashan and F. F. Henshaw. 1912. 411 pp., 8 pls. 30c.

299. Water resources of California, Part II, Stream measurements in San Joaquin River basin, by H. D. McGlashan and H. J. Dean. 1912. 439 pp., 7 pls. 35c.

*300. Water resources of California, Part III, Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.

Nos. 298–300 comprise all data concerning stream flow in California available up to September 30, 1912. The reports describe the drainage basins, precipitation, temperature, and forests, and give the results of work at gaging stations. See also Nos. 295–297.

338. Springs of California, by Gerald A Waring. 1915. 410 pp., 13 pls. 60c.

Describes briefly the physical features of California, including the coast ranges, Great Central Valley, the lava-covered region, the Sierra Nevada, the southeastern desert, and faults; defines "mineral water" and "pure water;" discusses source and amount of substances in waters; degree of concentration of natural waters and their properties, and the therapeutic value, temperature, and classification of mineral waters. The springs are described under the headings "hot," "carbonated," "sulphur," "saline," "magnesic," "iron," "artesian," "large cold," and "minor perennial" springs.

*345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(*b*) Ground-water resources of the Niles cone and adjacent areas, California, by W. O. Clark. Describes an area just east of the south end of San Francisco Bay. The investigation on which the report is based was made "to determine the source of the ground water, the quantity now being withdrawn, the amount available, and the area dependent on Alameda Creek." Describes the physiography and drainage of mountain and valley areas; gives records of precipitations in Alameda and Santa Clara counties and of the monthly discharge of Alameda Creek; discusses the source of the ground waters, the effect of the Niles-Irvington fault, contributions to the ground-water supply, relation of withdrawals to contributions, and gives a summary of conclusions

363. Quality of the surface waters of Oregon, by Walton Van Winkle. 1914. 137 pp., 2 pls. 20c.

Among the drainage basins described is Goose Lake, which has within historic times discharged southward to Pit River, a tributary of the Sacramento, and Klamath River, which enters the Pacific in northern California.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of water from Matilija Hot Springs, Calif., and of mine waters from Nevada City and Sulphur Bank [near Clear Lake], Calif.

*375. Contributions to the hydrology of the United States, 1915; Nathan C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(*a*) Ground water for irrigation in the Sacramento Valley, Calif., by Kirk Bryan. Describes the geography and the geology of the valley and the origin and the movements of the ground water, and discusses problems relating to wells and to pumping: gives a brief account of the progress of irrigation with well water.

398. Ground water in San Joaquin Valley, Calif., by W. C. Mendenhall, R. B. Dole, and Herman Stabler. 1916. 310. 310 pp., 5 pls. 25c.

Describes the geography of the valley and gives the geologic outline of the rocks of the border and the origin of the present surface; describes the occurrence and utilization of ground water, the chemical composition of surface and ground waters, and gives notes by counties. Contains 62 tables most of which relate to the qualities of the waters.

*400. Contributions to the hydrology of the United States, 1916; Nathan C. Grover, chief hydraulic engineer. 108. pp., 7 pls. Contains:

(*e*) Ground water for irrigation in the Morgan Hill area, Calif., by W. O. Clark.

426. Southern California floods of January, 1916, by H. D. McGlashan and F. C. Ebert. 1918. 81 pp., 17 pls. 15c.

Compares the flood of January, 1916, with previous floods, summarizes the damages, and gives flood-flow records.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II, Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xiv, 395 pp., 30 pls. (67–96) and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rain fall, and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201–289. Includes statement of the Director to the House Committee on Irrigation and extracts from the constitutions of States relating to irrigation.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. (54–146) $2. Contains:

*Report upon the location and survey of reservoir sites during the fiscal year ended June 30, 1891, by A. H. Thompson, pp. 1–212, pls. 54–57. Describes reservoir sites in California; for each reservoir site gives the location, height of dam, area inclosed by top contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River drainage.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. (108–184.) $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, pls. 147–182. Describes results of surveys of High Sierra reservoirs—Bear Valley, Kennedys Meadow, Kennedys Lake, Lake Eleanor, Tuolumne Meadows, Lake Tenaya, and Little Yosemite—and of Clear Lake, Cal.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 42 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant and swamp lands, and private and miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report, United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. 5 parts in 6 volumes. *Pt. IV, Hydrography, x, 756 pp., 102 pls. $1.75. Contains:

*Reservoirs for irrigation, by J. D. Schuyler, pp. 617–740, pls. 48–102. Describes rock-fill, masonry, and earthen dams, and hydraulic dam construction in California, and projected reservoirs; gives tables of reservoir capacities and areas.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest Reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The San Gabriel Forest Reserve, by J. B. Leiberg, pp. 411–428, pls. 143–146. The San Bernardino Forest Reserve, by J. B. Leiberg, pp. 429–454, pls. 147–153. The San Jacinto Forest Reserve, by J. B. Leiberg, pp. 455–478, pls. 154–159. Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific and part by streams that are lost in the sands of the Mohave and other deserts.

PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as the stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp.; 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and, water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in California, and detailed records of wells in Monterey and San Diego counties, California. These wells were selected because they give definite stratigraphic information.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California; and detailed records of wells in Alameda, Fresno, Kern-Orange, San Luis Obispo, Santa Clara, Tulare, and Ventura counties. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States. A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surfaces. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to ground-water horizons. Economic-geology and artesian-water maps are included in folios, if the conditions in the areas mapped warrent their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization on mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but many are usable, and will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive; also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sell for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

[1] Index maps showing areas in California covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

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All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*17. Marysville folio.
*39. Truckee folio.
*66. Colfax folio.
*101. San Luis folio.
*138. Redding folio.
*163. Santa Cruz folio.
193. San Francisco folio. 75c. in either edition.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the Pacific slope of California are the reports of the Chief of Engineers, U. S. Army, the State engineer and surveyor, the State conservation commission, and the State water commission.

The following reports deserve special mention:

Hall, W. H., Physical data and statistics of California, 1886.

Report of the Commissioner of Public Works to the Governor of California, 1895.

Report of the State Water Commission of California, 1912.

Subterranean storage of flood waters by artificial methods in San Bernardino Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 335–400, 3 pls.

Gives history and methods of water spreading and amount of water spread along Santa Ana River and other streams. Gives data in regard to precipitation, run-off, and stream percolation in the San Bernardino Basin. Describes the ground-water reservoir in this basin, giving data on fluctuations of the water table and the artesian head. Discusses ground-water fluctuations in other basins in southern California and draws conclusions as to the effect of water spreading. Includes a map showing the original area of artesian flow in the San Bernardino Basin and the areas in 1904 and 1912; also locations of wells and of lands used for spreading water.

Ground-water resources of Indian Wells Valley, Calif., by C. H. Lee. Conservation Commission of California Rept. for 1912, Sacramento, Calif., 1912. pp. 1–40 429, 5 pls.

A brief report covering the arid valley (also known as Salt Wells Valley) that lies mostly in northeastern Kern County but extends into Inyo and San Bernardino counties and comprises a part of the area included in Tps. 25–27, Rs. 38–30. Gives information in regard to precipitation stream flow, evaporation of ground water, and water supply available by pumping from wells.

Fish & Game Commission
Library Copy
SAN FRANCISCO, CALIF.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations.

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kansas; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls. (15–16). 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow, and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters, permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow; and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by George Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., and the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

143. Esperiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of Eastern United States, 1905; M. L, Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers (scope indicated by title) of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged by R. E. Horton.

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thomas H. Means.

Cost of stream-gaging work, by E. C. Murphy.

Equipment of a cable gaging station, by E. C. Murphy.

Silting of reservoirs, by W. M. Reed.

Farm-unit classification, by D. W. Ross.

Cost of power for pumping irrigating water, by H. A. Storrs.

Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

*155. Fluctuation of the water levels in wells, with special reference to Long Island. N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuations due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, ground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to underground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp. 1 pl. 10c.

Describes grain distillation, treatment of slop, and sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp. 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes; recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of The State of Missouri *v.* The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles; Distribution of rain fall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of water east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament, reviews work of bureau of hydraulics and agricultural improvements of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well waters, and methods of prevention, tests of capacity and measurement of depth, and cost of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the cause of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

*(e) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

*(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

*425. Contributions to the hydrology of the United States, 1917. N. C. Grover, chief hydraulic engineer. Contains:

(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94.

427. Bibliography and index of the publications of the United States Geological Survey relating to ground water, by O. E. Meinzer. 1918. 169 pp., 1 pl.

Includes publications prepared, in whole or part, by the Geological Survey that treat any phase of the subject of ground water or any subject directly applicable to ground water. Illustrated by map showing reports that cover specific areas more or less thoroughly.

ANNUAL REPORTS.

Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlain, pp. 125–173, pl. 21. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii. 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107–146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111–146. Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W. J. McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analyses of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v. 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6–16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous, medium, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Calif., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy load of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of available analyses.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 44 pp. 1908. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formation, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

616. The data of geochemistry (third edition), by F. W. Clarke. 1916. 821 pp. 45c.

Earlier editions were published as Bulletins 330 and 491. Contains a discussion of the statement and interpretation of water analyses, and a chapter on "Mineral wells and springs" (pp. 179–216). Discusses the definition and classification of mineral waters, changes in the composition of water, deposits of calcareous, ocherous, and siliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to [illegible] volcanism. Describes the different kinds of ground water and gives typical analyses. Includes a brief bibliography of papers containing water analyses.

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[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications as noted in abstracts.

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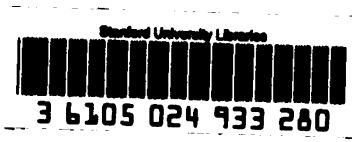

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